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ERRATA.

Page 76, line 6 (from bottom), *for* I nk *read* I think.
,, 77, ,, 21, *for* MUNDIANA *read* MUNDIANA.
,, 120, ,, 8, *for* KOTSCHYI *read* KOTSCHYI.
,, 168, ,, 24, *for* PRINGLEI *read* PRINGLEI.
,, 214, ,, 3 (from bottom), for *clandestium* read *clandestinum.*
,, 215, ,, 9, for *Cælogyne* read *Cœlogyne.*
,, 224, ,, 23, *for* L. nervosa read *L. nervosa.*
,, 260, ,, 13, for *D. brievianum* read *D. Brienianum.*
,, 278, ,, 23, *for* TRIFOLIUM *read* TRIFOLIUM.
,, 289, last line, for *Dipidium* read *Dipodium.*
,, 322, line 3 (from bottom), *for* LONGIBRACTATA *read* LONGIBRACTEATA.
,, 449, ,, 16, for *Phaœlnopsis* read *Phalœnopsis.*
,, 458, ,, 17, *for* Ser. ii. *read* Ser. II.
,, 491, ,, 3, *for* Miq. *read* Franch. & Sav.
,, 498, ,, 30, for *Didymorcarpus* read *Didymocarpus.*
,, 498, ,, 32, for *semitata* read *semitorta.*

EXPLANATION OF THE PLATES.

Plate	
I.	Pseudocodium De-Vriesei, Bosse.
II. III.	To illustrate Mr. Seward's paper on Pinites Ruffordi, Seward.
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THE JOURNAL

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A Revision of the Genus *Silene*, Linn.

By Frederic N. Williams, F.L.S.

[Read 20th June, 1895.]

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- II. Subdivision of the Genus into Groups, p. 12.
- III. Plan and Scope of this Revision, p. 19.
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- V. Systematic Enumeration of the Species, p. 38.

I. Systematic Affinities of *Silene* with other Genera.

As long ago as the year 1813 the elder De Candolle* recommended to botanists in search of a subject the genus *Silene* as the subject for a monograph, and in 1824 one appeared in the first volume of De Candolle's 'Prodromus.'† This, however, was not the work of De Candolle himself, but was undertaken at his suggestion by Adolph Otth, and is an undiscriminating catalogue of the then known forms, rather than a monograph in the proper sense of the word. In this enumeration, not only are series of the same species under different names given in different sections of the genus, but the diagnoses are so short and meagre, that they are quite useless for satisfactory determination of the species. Up to the time of the publication of Paul Rohrbach's monograph in 1868, no botanist since Otth had undertaken a revision of the entire genus, since the valuable contributions to our knowledge of the genus by Godron,* Willkomm,† and more especially Boissier,‡ dealt with the species of definite geographical areas; and the provisional schemes of classification put forward by each of them, as well as their grouping of species, were based on what appeared to be the primary characters, not of the known species of the whole genus, but of those which were found within a definite area. On account of the great number of species which were described after the publication of the first volume of the 'Prodromus,' the literature of which was scattered in various works in many languages, it became very desirable, as Rohrbach says, in spite of the difficulties of the subject, that a revision of the genus in the form of a systematic monograph should be undertaken by a botanist who was willing to devote time and labour to the work, both in examining the material, in overhauling and collating the authorities, and in bringing together and codifying on a uniform plan the scattered descriptions of the species.

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* Cat. Pl. Hort. Bot. Monspeliensis, p. 146.

† Prodr., i, p. 367.

It is more than a quarter of a century since Paul Rohrbach (whose early death from consumption cut short a promising career and was a great loss to science), at the suggestion of Grisebach and under the direction of Alexander Braun, enriched systematic botany with an elaborate analysis of the genus *Silene*. It would be beside my purpose to expatiate on the merits of this memoir, and it is with much diffidence that I have essayed to revise it. Since 1868 a large number of new species have been described (especially from Eastern countries), and much material for the elucidation of previously described species has been accumulated and in part examined: the re-adjustment of groups of species has proceeded with the examination of new material: the affinities of species among themselves, both in their relation to systematic position and to geographical distribution, have been more critically studied: and in a matter subsidiary to these, in the direction of precision and uniformity, conflicting schools of nomenclature have formulated and codified their rules, requiring here and there a change of name; so that in a revision of the genus, much has to be re-considered.

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* Obs. crit. sur l'inflor. du genre Silene (1847).

† Ic. Descr. Pl. Nov. Crit. Rar. Hispaniæ, i, p. 73 (1853).

‡ Fl. Orientalis, i, pp. 567-657 (1867).

The question as to whether Silenaceæ and Alsinaceæ should be considered as distinct natural orders or as suborders of Caryophyllaceæ need not be discussed, as it would be outside the scope of the present memoir. Caruel, in the continuation of Parlatore's 'Flora Italiana,'* substitutes the name Dianthaceæ for Caryophyllaceæ, which is quite feasible, as being founded on the best known genus of the order, instead of on the somewhat fanciful name of one of the species of that genus, widely known under various forms in cultivation, but not very widely distributed as an indigenous plant.

The division of the suborder Sileneæ proposed by Alexander Braun† (and generally accepted by botanists), on the presence or absence of commissural nerves in the calyx, I regard as satisfactory and natural; but I would consider this character as a secondary factor in the grouping of genera after the primary division into the tribes of Diantheæ and Lychnideæ, based on the character of the seeds,—a modification introduced by Boissier in his conspectus of the genera in the 'Flora Orientalis,' and followed by Willkomm in the 'Prodromus Floræ Hispanicæ.' This modification has the further recommendation of dispensing with the obscure and uncertain character of the mode of overlapping of petals in præfloration. The mode of overlapping is certainly not constant within the limits of the same genus. As to Braun's cardinal character derived from the nervation of the calyx, it does not seem to be absolutely constant. Schott‡ has shown that in *Viscaria alpina* (*i.e.*, *Lychnis alpina*, Linn.) the commissural nerves of the calyx are wanting, and for this reason he proposed the species as the type of an intermediate genus *Liponeurum*. The same objection was urged against including *Cucubalus Pumilio*, Linn., in *Silene*, but the nervation of the calyx in this species is at best very faint and indistinct, and the rudiments of commissural nerves are clearly evident at the base, more especially on the inner surface in the dried plant. This latter plant, however, shows more affinity with some species of *Saponaria* than does *Viscaria alpina*, which differs from typical forms of *Viscaria* only in this one characteristic. In comparing *Viscaria alpina* with *V. vulgaris* (a plant found at low-lying stations), though

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* Vol. ix, p. 239 (1892).

† Flora (1843), i, p. 363.

‡ Analecta Botanica, i, p. 55.

they are closely allied to one another and ought certainly to be included in the same genus, they are readily distinguishable as species; and it would be an unnatural separation to transfer the former to another group altogether, or to set it up as the type of a new genus. Then, again, we have Braun's observations from living specimens, in which faint commissural nerves are sometimes to be found, and at other times the nerve loses its commissural character by bifurcating at the base of the calyx into two branches, so that each segment of the calyx appears to have three nerves. Here, then, is a fresh proof, if one were needed, for the maintenance of the position that within the limits of the same group of plants, the classificatory value of a character, often of more than generic importance in single genera, at the most made use of for the discrimination of species, can be even altogether worthless, without thereby undervaluing its importance as a character for separating groups of species. Moreover, a similar anomalous exception occurs sometimes in *Drypis spinosa*.

I here propose the names of "Silenoideæ" and "Gypsophiloideæ" for the two subtribes of Lychnideæ. The suborder "Silenoideæ" of Engler and Prantl* is co-extensive and synonymous with the suborder "Sileninеæ" in the classification and conspectus of genera as given at the end of this introduction. In this terminology of groups I have followed a general suggestion made by Mr. E. M. Holmes at the International Botanical Congress of Genoa in 1892.

I will now discuss the distinguishing characters of the group of genera included in the subtribe *Silenoideæ*. What are they? As in other groups or divisions, the usual answer to the question is that all species which agree in essential characters should belong to one genus. But what these essential characters or distinguishing marks in any particular group may be, will depend most frequently on the critical judgment of the individual botanist. Nägeli lays it down that for any particular plant that character is to be considered as primary and essential which is shown to be constant. In known relationships, Nägeli is right: a constant character is at the same time an essential one; but the question is, whether it is in general essential to the conception of the organism as a plant, or rather as characteristic of the order, the tribe, the genus, or the species. Thus the presence of chlorophyll is essential to the structure of the higher plants, but green leaves do not constitute an essential character in the natural order or the genus. There can be, therefore, constant characters, which, in spite of their constancy, are not essential to the appreciation of affinities, or for the grouping of species and of genera, and which in fact need not imply that they are in any way related to one another. Generally we can, as Nägeli very rightly remarks, say that there is no character, however important it may seem to be, whether morphological or physiological, which is of necessity of systematic value. In each grade we must rather decide by analogy and by demonstration, what characters in this particular grade of subdivision are of systematic value in their relation to the grouping of genera or of species. Let us then apply the methods of these theoretical "points d'appui" to the group of genera comprised within the subtribe of *Silenoideæ* (*i.e.*, the tribe *Lychnideæ* of Braun). If we look about, in various series of species which seem to fall into more or less natural groups, for that character in the floral organs which, constant in certain groups of species, can be used for the larger grouping of genera, the one that more especially suggests itself, after examining the points of resemblance in several series of species, is the structure of the fruit. The following points are obvious and worthy of notice:—

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* Die Natürlichen Pflanzenfamilien, Theil iii (1889), 1 b, p. 69.

(1) The nature of the fruit; whether a berry (*Cucubalus*), or a capsule.

(2) The relative position of the carpels to the segments of the floral envelope; whether alternate with the lobes of the calyx (*Uebelinia* and *Agrostemma*, in which also the indicated segments of the capsule are isomerous and never oligomerous), or whether they are opposite to them.

(3) The manner of dehiscence of the capsule; whether circumscissile somewhat in the form of a pyxidium (*Drypis*), or by teeth as many (*Coronaria*, *Viscaria*), or twice as many (*Silene*, *Melandryum*), as the styles.

(4) The internal structure of the capsule; whether without (*Lychnis*, *Coronaria*), or with dissepiments (*Eudianthe*, *Silene*).

To these may be added that the carpophore is very short in *Drypis* and *Uebelinia*, and absent in *Agrostemma*, and that *Uebelinia* is further distinguished from the latter in the claws of the petals being without lamellated margins.

The characters which are thus selected for the purpose of grouping allied genera are of primary importance; to these may be added two genera widely diverse from one another, but which are apparently of lower grade in differentiation, and the species of which by some systematic botanists would be very properly distributed among one or more of the other genera. These are—*Petrocoptis* and *Heliosperma*. The first is evidently very near *Coronaria;* the species of the other combine the unilocular capsule of *Melandryum* with the habit of *Silene*. The salient character of both is found in the morphological character of the seeds, which after all is of specific rather than of generic value. Though the presence of an appendix or ligule at the junction of the claw with the blade of the petal is of subordinate specific importance, we find that the petals are imbricate (in the narrow sense) in præfloration in the case of *Petrocoptis*, while in *Coronaria* they are strictly convolute in præfloration.

In the delimitation of genera and transference of groups of species which have taken place from time to time in the suborder Sileninеæ, no genus has probably received such rough handling and mutilation, more particularly at the hands of critical systematists in continental floras, as the genus *Lychnis*. Even in an attenuated Linnean sense it is not so much as admitted into some of the German floras; while the compilers of various English floras, rather than introduce strange names into their lists of genera, have indefensibly enriched *Silene* at its expense.

The only absolute difference between *Silene* and *Lychnis*, as defined by Linnæus, was that the former had three styles, and the latter five; and *Agrostemma* is only distinguished from *Lychnis* in having the lamina of the petal undivided. However, as the species of these three genera came to be more carefully studied, it was soon apparent that they should either be fused in one genus and broken up into natural sections, or that new genera should be formed out of them, in which the number of the styles should be considered as a character of very secondary importance, and in which the general structure of the ovary and capsule should determine the grouping of the species.

A unilocular capsule, occasionally plurilocular at the base, is characteristic of the natural order Caryophyllaceæ; and this character has been selected for grouping the species of Silenoideæ (after eliminating the genus *Cucubalus*) into two other primary subdivisions—those in which the capsule is truly unilocular, and those in which the capsule has remains of dissepiments at the base. The latter will include most of the species hitherto included in *Silene*, and exclude such species as *S. noctiflora* and *virginica*, Linn., for which (with some species of *Lychnis*) the genus *Melandryum** was founded by Röhling in 1812. The former will include *Lychnis*, in a very limited sense, and *Agrostemma*, and also the Linnean genus *Coronaria*, which was proposed in the first and second editions of ‘Genera Plantarum,’† but fused with *Agrostemma* in *Species Plantarum*. In following up the secondary subdivisions of these two main groups, we will notice first the affinities of the *Lychnis* group, and then the affinities of the *Silene* group.

In *Agrostemma Githago*‡ the carpids are alternate with the teeth of the calyx, in *Lychnis chalcedonica* they are opposite to them; this is a more natural distinguishing character between the two genera than the segmentation of the petal. Moreover, in the former species, there is an indication of segmentation in the emarginate petals. In *L. chalcedonica* again, which may be considered a typical species of the genus, the dehiscent capsule is 5-dentate (isomerous with the styles); in Röhling's genus *Melandryum*, which includes *L. dioica*, Linn., and *L. diclinis*, Lag., as well as those species of *Silene* in which the capsule is unilocular, the teeth of the dehiscent capsule are twice as many as the styles (dimerous). The genus *Heliosperma*,§ which branches off, as it were, from *Melandryum* (both having common characters which separate them from *Lychnis* proper), was founded by Reichenbach in 1841 on *Silene quadrifida*, Linn., to include those species of *Silene* in which the capsule is unilocular and dehisces by twice as many teeth as there are styles, and in which the seeds are crested on the dorsal surface. A. Braun further circumscribed the limits of *Lychnis* by including in his genus *Petrocoptis*‖ two Pyrenean species, *L. nummularia*, Lapeyr., and *Silenopsis Lagascæ*, Willk., which have imbricated petals, and seeds bearded at the hilum. With the view of still further restricting the significance of *Lychnis*, he also[*] proposed to revive the Linnean genus *Coronaria*, which, as far as the European species of *Lychnis* are concerned, would include *L. Coronaria*, Lam. (*Agrostemma Coronaria*, Linn.), *L. Cyrilli*, Richter, and *L. sibirica*. So that this would leave the genus *Lychnis* represented in Europe solely by *L. chalcedonica* of Russia. *Coronaria glabra, etc.*, of 'Hort. Upsal.,' p. 115, having capsules plurilocular at the base, is to be referred to the *Silene* group, and is the species on which Reichenbach founded his genus *Eudianthe*.

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* The name of this genus is frequently spelled *Melandrium*; but the name is borrowed from Pliny, who spells it as *Melandryum* in his Natural History.

† Ed. 1, p. 135, n. 380; ed. 2, p. 200, n. 450.

‡ Cosson regards this as a quasi-cultivated form, of which the type is the Anatolian *A. gracile*, Boiss. There are no other species known.

§ Reichb., Repert. Herb., p. 206.

‖ Flora (1843), p. 370.

The genus *Coronaria*, which it is proposed to revive, is thus defined by Linnæus:—"*Calyx*. Perianthium monophyllum, clavæforme, striatum, erectum, coriaceum, 5-angulare, 5-dentatum, persistens: angulis minoribus interjectis. *Corolla*. Petala 5: ungues longit. calycis, margine aucti: limbus planus, speciosus: bracteæ cordatæ: nectarium componitur ex 2 denticulis in singuli petali collo enatis. *Stamina*. Filamenta 10, longit. tubi corollæ, alterna seriora, singulo ungui petalorum singulum insidens; antheræ incumbentes. *Pistillum*. Germen subcylindraceum. Styli 5, distantes, erecti, longit. staminum. Stigmata simplicia. *Pericarpium*. Capsula cylindracea, unilocularis, apice dehiscens. *Semina* plurima, subrotunda." This genus has been taken up by Garcke in the successive editions of 'Deutschlands Flora,' who uses it in very much the same sense as A. Braun. Engler and Prantl[†] divide *Lychnis* into two subgenera, *Eu-lychnis* and *Coronaria*. If we consider each of these as a genus, *Lychnis* in this very limited sense will almost exactly correspond with the *Hedone*[‡] of Loureiro, who recorded *L. coronata* under the name of *Hedone sinensis*.

We come now to the *Silene* group, including the species in which the capsule is plurilocular at the base. The species referable to this group can be divided into two sections:—(1) those in which the capsule dehisces by twice as many teeth as there are styles, and which include *Silene*, Linn. (sensû limitato), and some species of *Lychnis* with plurilocular capsules, for which Reichenbach proposed the genus *Eudianthe*[§]; and

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[*] Flora (1843), p. 368.

[†] Die Natürlichen Pflanzenfamilien, Theil iii (1889), 1b, p. 73.

[‡] Fl. Cochinch., p. 351.

[§] Nom., p. 206 (1841).

(2) those species in which the capsular teeth are isomerous with the styles, and which comprise the genus *Viscaria* of Röhling. If species which have five styles are excluded from *Silene*, it would be better perhaps to include *Polyschemone nivalis*, Schott (*Lychnis nivalis*, Kit.), in *Eudianthe*, though Rohrbach in his monograph has preferred to retain this species as well as *Agrostemma Cœli-rosa** in *Silene*. As long ago as 1825, Robert Sweet, in discussing the affinities of the plant now known as *Heliosperma alpestre*, remarked that the genus *Silene* was very much overgrown, and threw out the suggestion that "those (species) with an inflated calyx will probably form another natural genus." Though the disintegration of such genera as *Silene* has not proceeded on the lines indicated by this distinguished horticulturist, and though superficial and obvious characters such as the structure of the floral envelope have not been considered of generic importance, a study of essential characters in definite groups of species only emphasizes still more what Fries said, that it is a "genus vastissimum undique ad reliqua radios emittens." †

Turning to the subtribe of Gypsophileæ, we find that in the species of *Vaccaria* only are there dissepiments at the base of the capsule, and that *Acanthophophyllum* ‡ (with which should now be united Bunge's genus *Allochrusa*) is alone distinguished from the others in having a subindehiscent capsule, and like *Drypis* opens irregularly by circumscissile rupture. These subsidiary characters only show how genera artificially or arbitrarily delimitated tend to intergrade with, even if they do not sometimes overlap, one another. It would be outside the scope of our subject to discuss the affinities of *Saponaria* and *Gypsophila*, though if one were sunk in the other, which would be quite feasible, the necessity for earmarking any characters as differential would be removed. A connecting link between *Gypsophila* and the Diantheæ is *Gypsophila ortegioides*, Boiss., but what is to become of this species I do not know. It constitutes the section *Phryna* in Boissier's grouping of the oriental species; as the Greek name suggests an outcast, it might have to become the type of a new genus. Lastly, in the

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* Linn., Sp. Plantarum, ed. I, p. 436.

† Flora (1843), I, p. 123.

‡ For a recent revision of this genus, see an interesting and valuable memoir by M. Golenkin in Act. Hort. Petropolit., xiii (1893), p. 77.

Diantheæ, connecting links between *Tunica* and *Dianthus* are *Tunica Pamphylica*, Boiss. et Bal., in which each segment of the calyx has six or seven nerves (instead of 1–3), and on the other hand *Dianthus prolifer* and *Dianthus leptopetalus.* Generally speaking, as may be seen from this review of differential characters, the characters which separate the genera *Saponaria*, *Gypsophila*, *Tunica*, *Dianthus*, and *Velezia* are much less distinctive than those which separate other genera in the suborder Sileninеæ. Some German botanists have proposed to establish intergradient genera ("Mittelgattungen") for definitely characterized species of an evidently intermediate type: but this device would certainly force upon systematists the fact that many genera are unnatural entities.

We find it frequently stated that the production of hybrid forms is an important matter, in so far as minute variations in the form of the floral organs determine the position of certain genera. Herbert enunciated the principle that successful crossings can only take place between two individuals of the same natural genus, and that, therefore, species which possess this faculty ought to be included in the same genus. Nägeli also seems to join issue on this principle. On the other hand, the exceptions to this rule are not many, and the question whether in these cases the two genera should not be united, presents itself. The capacity for producing hybrids is inherent in the productive elements of the species concerned, a kind of natural affinity which, apparently homogeneous with the similarity in external structure of the reproductive organs, on which, as explained above, the systematic position of genera is based, need not necessarily be associated with it. This sexual affinity or selective relationship then is peculiar to the species, sometimes only to the individual under favoured conditions. This sexual affinity, moreover, is apparent only in certain species of the same genus, and further in a group of closely allied genera it is found that the species of one may hybridize easily, as in *Dianthus*, while the species of another hybridize with difficulty, as in this particular genus *Silene*. So that it may happen, though not necessarily, that sexual affinity and morphological relationship may go hand in hand. Crossing of species then, when successful, produces hybrids. In these the characteristics of the two species are combined sometimes in equal proportions, sometimes with great preponderance of one or the other parent; and there is often a difference in the result in reciprocal fertilizations. Moreover, certain hybrids, such as those of *Datura*, which are fully fertile *per se*, divide in the offspring, partly in the first generation, and completely in two or three succeeding generations, into the two component species, even when close-fertilized.

In discussing the crossing of *Melandryum rubrum*, Garcke, and *Melandryum pratense*, Röhl., with *Silene viscosa*, Pers., Rohrbach draws conclusions as to the greater sexual affinity between *Melandryum* and *Silene*, than between *Lychnis* and *Silene;* but in this particular instance it does not apply, as L. Celakovsky has shown that in *S. viscosa* the capsule is truly unilocular, and not more or less septate at the base, and that therefore this species should be transferred to *Melandryum*. If then we take into consideration the number of the styles, and the number of the teeth formed by dehiscence of the ripe capsule, we find that the following genera are isotypic with these three:—*Eudianthe*, *Viscaria*, *Heliosperma*, *Petrocoptis*, and lastly *Coronaria*.

A tabular conspectus of the genera here mentioned will best illustrate their differential diagnosis:—

Tribe Lychnideæ (or Sileneæ), Subtribe Silenoideæ.

A. Capsule unilocular.
  a. Carpels alternate with the teeth of the calyx. Anthophore none. Styles 5. Capsule 5-dentate .. .. .. AGROSTEMMA.
  b. Carpels opposite the teeth of the calyx. Anthophore conspicuous, often elongated.
    α. Capsule dehiscing by teeth equal in number to the styles.
      * Petals convolute in præfloration. Appendices fornicate at the base .. LYCHNIS.
      ** Petals convolute in præfloration. Appendices efornicate at the base .. CORONARIA.
      *** Petals imbricate in præfloration. Seeds bearded at the hilum .. PETROCOPTIS.
    β. Capsule dehiscing by twice as many teeth as the styles.
      * Seeds crested on the dorsal surface. Styles 3 .. .. HELIOSPERMA.
      ** Seeds not crested on the dorsal surface. Styles 5, rarely 3 .. MELANDRYUM.

B. Capsule plurilocular at the base.
  a. Capsule dehiscing by teeth equal in number to the styles .. .. .. VISCARIA.
  b. Capsule dehiscing by twice as many teeth as the styles.
    α. Styles 5 .. .. EUDIANTHE.
    β. Styles 3 .. .. SILENE.

II. SUBDIVISION OF THE GENUS INTO GROUPS.

The genus *Silene* was founded by Linnæus, and was defined by him in the first edition of his 'Genera Plantarum.' * The genus is characterized as follows † :—

> *Calyx.* Perianthium monophyllum, clavatum, leve, 5-dentatum, persistens.
>
> *Corolla.* Petala 5. Ungues angusti, longitudine calycis, marginati. Limbus planus, obtusus, emarginatus. Nectarium componitur e duobus denticulis, in collo cujusvis petali.
>
> *Stamina.* Filamenta 10, subulata, alterna, unguibus petalorum inserta, seriora. Antheræ oblongæ.
>
> *Pistillum.* Ovarium cylindraceum. Styli 3 vel 5, simplices, staminibus longiores. Stigmata contra solem flexa.
>
> *Pericarpium.* Capsula cylindracea, tecta, 3–5-locularis, apice 6-fariam dehiscens.
>
> *Semina* plurima, reniformia.

This description sufficiently circumscribes the species in the genus as understood by Rohrbach, except that the calyx (perianth) is not always "leve," and that the lamina (limbus) of the petal is not often "emarginatus."

By Adanson,‡ *Silene* was disintegrated into six distinct genera, in contravention, however, of the Linnean canon, which says, "Habitus occulte consulendus est, ne genus erroneum lævi de caussa fingatur." § It was on such a secondary character that Adanson carved his six genera out of the Linnean genus. They are—Silene, Atocion, Oberna, Otites, Steris, and Kaleria. As a synonym Linnæus cites *Viscago*, Dill. Hort. Eltham. p. 309.

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* p. 132, n. 372 (1737).

† With the verbal emendations of Richter's 'Codex Linneanus.'

‡ Familles des Plantes, ii, p. 254 (1763).

§ Philosophia Botanica, ed. II, p. 121.

The sections into which Adolph Otth proposed to group the species in the first volume of De Candolle's 'Prodromus' are so unnatural, and characterized by such indefinite characters, that it would be impossible to attempt a revision of the genus on the principles followed by that botanist. Others followed Otth's classification, with unimportant alterations, in subsequent works, in which the plants of the order Caryophyllaceæ were systematically or geographically dealt with, so that the first classification of species of *Silene* which can properly claim any attention from a scientific point of view dates from Godron's* masterly essay on the forms of inflorescence in this genus.

Godron certainly attaches no importance to the existence of septa at the base in the ripe capsule or to their absence, and includes, therefore, all species belonging to *Melandryum* subg. *Elisanthe*, as well as the genus *Heliosperma* (to which he falsely ascribes capsular dissepiments), in *Silene;* and this same view of the limits of the genus is taken by Bentham and Hooker.†

The grouping of the genera of the suborder Sileneæ on the principle first proposed by Alexander Braun has already been alluded to, and Rohrbach has adopted in the main Godron's primary character of the disposition and mode of inflorescence, except in reference to the group *Lychnioides*, which he has relegated to a subordinate and secondary position, but which, however, in this revision disappears altogether, as the species are placed in the genus *Eudianthe*. The genus *Silene*, as understood and circumscribed by Braun, included a large number of species which formed a very natural group sufficiently marked off from other genera, as defined at that time, but very difficult to form into subsidiary groups, on account of the absence of well-defined primary and secondary characters within the limits of the genus which might be utilized for the purpose. In the first place, however, he fixes on the character of the mode of overlapping of the petals in præfloration as the basis of division into two subgenera, before proceeding to group the species into sections. Boissier points out that Alexander Braun first drew attention to this character in the genus, and the speciousness of such a line of cleavage is best explained in his own words, which are here translated from 'Fl. Orientalis,' vol. i:—"A genus very difficult to break up into groups of species, since the characters for defining sections are either absent or not strongly marked. Thus Godron demonstrated that all forms of inflorescence which were met with in the genus, the dichotomy, the panicle, the unilateral raceme, are only modifications of the cyme, and that they pass one into another in allied species, and even in plants of the same species. The number of the nerves of the calyx varies in plants otherwise alike in all their characters. Alexander Braun pointed out a character depending on the imbricative (quincuncial) æstivation of certain species, but this mode of overlapping of the petals in æstivation in the genus is not really quincuncial (arising, as it were, from spiral insertion of the petals), but is a deformation of convolute æstivation (arising from verticillary insertion), to which, in allied species and often in the same species, it returns. The seeds, which are generally canaliculate on the dorsal surface, may become plane, then convex, and, finally, in *Heliosperma*, carinate [with the rows of tubercles transformed into crested spines *]. With these considerations, I have not proposed sections such as it would be incumbent on a future monographer of the whole genus to specify, but I have attempted to arrange the Eastern species in natural groups, as far as I was able, according to general characters and habit in the absence of definite and well-marked characters." Boissier says how he tried first one character, and then another, and afterwards a combination of two or more, only to find that his hypothetical sections invariably either overlapped one another or failed to include some of the species.

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* Observ. crit. sur l'inflor. du genre Silene (1847).

† Genera Plantarum, i, p. 147: "Ovarium uniloculare vel imâ basi septatum multiovulatum; styli vulgo 3. Capsula apice in dentes vel valvas breves 6 rarius 3 dehiscens."

Rohrbach first of all divides the genus into two subgenera:—(1) *Behen*, in which the leading character is "æstivatio petalorum imbricativa"; and (2) *Silene* proper, in which the leading character is "æstivatio petalorum alternatim contorta." In connection with this I should like to refer to an interesting letter from Alexander Braun to J. Gay, preserved in Herb. Kew. In this letter diagrams are given of the mode of overlapping of the petals in æstivation in *Silene Pumilio;* and quoting from a letter from Pacher, he says that usually the petals are imbricate in æstivation in this species, but that this is not constant, and occasionally they are contorted. There is also an interesting note in J. Gay's handwriting on specimens of *Arenaria pungens* in reference to this same character:—"Petalorum æstivatio nunc imbricata, nunc sinistrorsum contorta." I consulted the late Sereno Watson (who has studied the North American species of *Silene*) as to his views on the importance of these primary characters. In a letter received from him only a few weeks before his lamented death, he says:—"I have never considered the characters that you mention of any special importance, and have paid them no attention. If *S. Douglasii* and *S. nivea* are to be separated from our other species on the imbrication of the petals, it is evident that the division is not a natural one." Again, "æstivatio *alternatim* contorta" is somewhat obscure, but Mr. Watson points out that it appears to be illustrated in Eichler's 'Blüthendiagramme,' on p. 106, fig. 41A; and is what is called "antidromy" or "heterodromy," the petals in the flowers of the axis overlapping in one direction, and those of the branches in the opposite. Now the species of *Silene* are difficult to discriminate in living specimens, especially before the ripening of the capsules, and still more so in the case of herbarium specimens; and were the mode of imbrication of the petals, if such variation is to be depended upon, to be insisted on as a primary character, it would of necessity impair, if not stultify, the value of the result obtained from an attempted examination of the greater part of the material afforded by collectors and distributors. I propose, therefore, by slightly modifying Rohrbach's arrangement, to base the primary subdivisions of the genus on the structure of the calyx; and to exclude from his subgenus *Behen* those few species in which the two characters of a calyx with anastomosing veins and inflated at the time of flowering are not associated, viz., *S. pygmæa*, *S. turgida*, and *S. Douglasii*. I propose also to follow Engler and Prantl* in considering each division of *Silene* proper as a subgenus, thus making three subgenera instead of two. I would further suggest *Gastrosilene* as a substitute for *Behen*, which is somewhat of a misnomer. *Cucubalus Behen*, Linn., and *Behen vulgaris*, Moench, are certainly superseded names for *Silene inflata*, the best known species of the subgenus, but *Silene Behen*, Linn., is a good species, and belongs to another subgenus, so that the name as taken up by Rohrbach is misleading. *Gastrosilene* is pseudhomonymic also with *Gastrolychnis*, one of the sections of the genus *Lychnis* proposed by Fenzl in Endlicher's monumental work.

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* Not in the original.

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* Die Natürlichen Pflanzenfamilien, Theil iii (1889), p. 70.

The limits of the genus will be more conveniently circumscribed if Rohrbach's generic character of a unilocular capsule septate at the base is maintained; so that many of the North American species described by Sereno Watson and most of the species from the province of Yun-nan, described by M. Franchet,* in which the ovary and capsule are strictly unilocular, should be transferred to the genus *Melandryum*. It would be better also to exclude four species, retained by Rohrbach in his monograph, in which the ovary has five styles, and is, of course, 5-septate at the base, viz., *Polyschemone nivalis*, Schott, *Eudianthe Cœli-rosa*, Fenzl, *E. corsica*, Fenzl, and *E. lœta*, Fenzl.

Eusilene itself is divided into three sections according to the form of the inflorescence. In the same way that the principal primary subdivisions in the grouping of natural genera within the limits of the same family cannot be carried out with logical precision, in so far as a character in one genus is of first importance, and in another may be of no systematic value whatever, so the same thing obtains in the subdivision of a genus into several groups of higher or lower grade. Thus it would be unnatural to separate *S. grisea* from *S. flavescens;* yet, strictly speaking, the first should be in *Botryosilene*, while *S. flavescens* is in its place in *Dichasiosilene*. Similarly the same reason holds with *S. Sieberi*, *S. Fenzlii*, and certain forms of *S. italica*, which should be in the section *Dichasiosilene*, were it not that their special characters unmistakably show their relationship with *S. italica*. We must, therefore, take into consideration other characteristics in admitting apparently aberrant types into one or the other of the primary groups in the subdivision of the genus. Rohrbach's greatest difficulty was in the section *Botryosilene*. The peculiarity in certain species for the flowers to bend downwards at the time of flowering, an observed fact utilized by Otth in his grouping of species, when applied to the section as a whole, leads to unnatural separation of closely allied forms. In the same way it is impossible correctly to circumscribe a natural series of forms by means of the various modifications of the raceme, since frequently one type of racemose inflorescence grades into another, and also species having varied modifications of the raceme are allied by more distinctive and important characters.

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* Bull. Soc. Bot. France, xxxiii (1886), pp. 417–428.

And here, as in many other cases, it cannot be too clearly laid down that natural relationship is to be found in the possession of essential characters in the aggregate, and forms cannot be classified by the arbitrary selection of a single, albeit though a conspicuously distinctive character, and that the constancy of the specific type is due to the maintenance of the balance and the absolute correlation of the structure of the different parts of the plant with the conditions of life and the environment in which it lives; so that any undue exaltation or deficiency in the structure or function of any organ or part of an organ, whether arising within the plant itself or in its environment, tends to the impairment or to the loss of that balance, and consequently to instability and variation.

Rohrbach first of all divides the section Botryosilene into two groups, according to the structure of the substance of the calyx, whether coriaceous or membranaceous; and then the second group lends itself more readily to division into subsidiary groups on the basis of the type of the form of racemose inflorescence. I wish to draw attention more particularly to this section rather than to any of the other primary groups, because if some working botanists hold that there are weak points in the method and arrangement in Rohrbach's classification, it is in this section of Botryosilene that such are to be found. But, as he says, after a good deal of consideration and comparison of the relative value and specific importance of salient characters, he has not succeeded in finding a more natural method of associating the known species into definite subsidiary groups; and in any future improvement upon this, the critical reviser must have in his mind a general idea of the complete series of species, otherwise, instead of improving upon the scheme of classification submitted, he is likely to fall into worse errors.

I will now, therefore, discuss a few specific characters in detail. A pre-eminent character to select is the form of the seed. Within the limits of the same group of allied forms the seed varies chiefly in its size (generally depending relatively on the size of the flower and capsule), in its form and structure scarcely at all. However, in a widely distributed and polymorphous species like *Silene inflata*, we find transitional modifications in the form of the seed. On the other hand, almost the only difference between *S. rigidula* and *S. echino-*

sperma is in the structure of the seed. Of not less importance as a character is the nervation of the calyx, especially in respect of the branching of the ten primary nerves. The presence or absence of such anastomosing branches is a variation not altogether unknown within the limits of the same species; yet by this character is *S. linearis* separated from *S. arenosa.* Of often more than specific importance is the form of the fructiferous calyx, as to whether it is contracted and almost closed above, or uniformly cylindrical, or campanulate and expanded under the reflexed petals.

Again, to take an example from other organs, within the same group of species, the filaments, which are usually glabrous, in a number of species are invested with long cilia.

As to the duration of the life of the plant, this seems a fairly constant and reliable character; likewise the manner of growth, whether uniaxial (as is generally the case) or biaxial. As an exception under abnormal conditions, we may instance *S. ciliata*, in which the flowering stems are terminal, but which under cultivation sometimes produces a main axis with infrarosular flowering stems as in *S. melandryoides.* The form of the different calyx-teeth varies sometimes in the same flower; since this, however, is associated with other characters in the structure of the calyx, it is therefore of value in separating species. On the contrary, should such variation be found in individuals of what are supposed to be the same species, then analogy must decide whether it is desirable to separate the two as distinct species. In this connection may be noted the form of the calyx, which at the time of flowering is often very different from that which incloses the ripe capsule.

As to the form of the capsule, and the relative length of the capsule and carpophore, the variations within certain limits to which both are subject are different for different groups, and their importance as a character can only be ascertained and appraised by comparison in the different groups. On the other hand, the presence of cilia on the claws of the petals is a character subject to variation more often, even in the flowers of the same stem; especially is this noticeable in the group of *S. Saxifraga*, while in most other groups the character of "ungues glabri" and "ungues ciliati" is sharply defined. The same obtains in the definite character of the auriculate appendage or dilatation at the junction of the claw with the blade, which, while, for example, in Dichasiosilene distinguishes the series *Auriculatæ* from all the other perennial species of the section, in some species is to be found in all stages of transition from slight broadening at the apex of the claw to the development of a distinct lobe on each side of it. The degree of segmentation in the blade, the width of the lobes, and lastly the colour of the petals are not characters which may serve for the separation of species, apart from other and more distinctive characters.

Of still less importance is the general pubescence of the plant; which, as is well known, is a character that often depends on external conditions, and on difference in station and in vertical range. Somewhat more constant and reliable is the pubescence of the calyx, though this is subject to considerable variation. The least important, or which amounts to the same thing, the most unreliable character to make use of in the limitation of species is that of the form of the foliage-leaves. Although this has been long recognised by systematic botanists, in a genus like *Silene*, it is necessary to emphasize the fact; to justify, for example, the circumscription of *S. chloræfolia*, whose aberrant forms present indeed a very diverse type and appearance, forms which Rohrbach thought desirable to include in this species, and, as he shows in his diagnosis, by a continuous series of intermediate forms are connected one with another, which makes a separation into four distinct specific types scarcely feasible or possible. In the same way and by the same variable character is justified the inclusion of several forms (superficially distinct) within the limits of a species.

In giving greater importance to the presence or absence of the coronal appendix, I venture to differ from Rohrbach, as modifications of it have a systematic value in other genera.

III. PLAN AND SCOPE OF THIS REVISION.

The Revision of the genus is based on Rohrbach's Monograph, published in 1868. Specimens of most of the species described by him have been examined, excepting only those of which authentic types were not obtainable for examination. Species have been transferred from one group to another, only after examination of properly authenticated specimens and the remarks on their structural character by other observers have satisfied me that occasional deviation from the sequence in

Rohrbach's enumeration is desirable in the interest of accuracy of description, and with due regard to the affinities of allied species. Species described since the publication of Rohrbach's work have been intercalated in their proper place, or (in many cases) reduced as synonyms or as varieties of previously known species.

The matter under the head of each species is arranged as follows. The name of the species is followed by the authority for the name and the work or memoir in which it was first published.* This is followed by the citation of a published figure of the plant, if a satisfactory one is known to me: the third reference is to the page of Rohrbach's 'Monograph' on which the species is described. The species described by Rohrbach have not been again described in this Revision, unless subsequent re-examination of specimens has obviously impaired the accuracy of Rohrbach's description; slight variations, discrepancy, or hiatus in his diagnosis have been noted and rectified in form of addenda after the references following the name. The species known and discovered subsequently to the publication of Rohrbach's work have been described on a uniform plan, and as far as practicable the diagnoses are of uniform length and conciseness; and species which have been transferred to another group or section have not been redescribed unless such transference has entailed considerable and important verbal alterations. After the description or bibliographical references are often given a few differential characters distinguishing it from allied forms, more particularly in subsidiary groups which include several species. The synonymy, in so far as it is identical with that given by Rohrbach, is omitted, but under this heading additional synonyms (reduction of new? species) are given, and some synonyms, incorrectly given by Rohrbach, are excluded. This is occasionally followed by critical notes or explanatory comments on the species, where they may seem to be required. The last item under the heading of each species gives the limits of the geographical range. It has not been thought necessary to give the complete geographical distribution, as any extension of the range of the species as defined by Rohrbach is thus sufficiently indicated. The habitat of species not distributed over a wide area is given in the usual way. In the case of species of wide distribution the extreme geographical limits in each direction are given. Records extending the limits of the species are everywhere given. As frequently as possible I have added the date of publication to the reference cited for the species, except in the case of works repeatedly cited.* For the dates of works and memoirs not readily accessible I am often indebted to the excellent and carefully edited series of Botanical Catalogues issued by Messrs. Dulau of London, and by Messrs. Friedländer of Berlin; in all cases in which I have referred from the Catalogue to the work cited I have found absolute accuracy in titles and dates.

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* For species described since 1868, references are sometimes given to two works in which a description of the species is to be found, as the publication in which a new species is first described is often inaccessible.

In the matter of absolute priority in names of species, I have preferred not to change a few old-established names which are always met with in the floras generally used, and under which the literature of the species is always to be found, in favour of obscure, little known (and usually inappropriate) names, which may possibly have antedated them in publication by a few months. The "plea of convenience" and stability in nomenclature is of far more scientific importance in morphology than endless name-changing for reasons of priority.

Of the 390 species enumerated in this Revision, published figures are cited for 172 species; and of the 141 varieties enumerated, additional figures are cited for 29. Where a figure is obviously bad and misleading, I have not thought it worth while to refer to it. I have not always cited what may appear to be the best plate, but, for convenience of reference and to facilitate the comparison of species, have preferred to quote works in which several species are figured, such as the 'Flora Græca,' Reichenbach's 'Ic. Flor. Germ. Helv.,' Willkomm's sumptuous 'Icones,' and Cosson's 'Illustr. Fl. Atlanticæ.'

The position of *Silene* and its relationships with the other genera of Silenoideæ are shown at the end of a previous section. The following table shows the position of the subtribe Silenoideæ in the natural order Caryophyllaceæ :—

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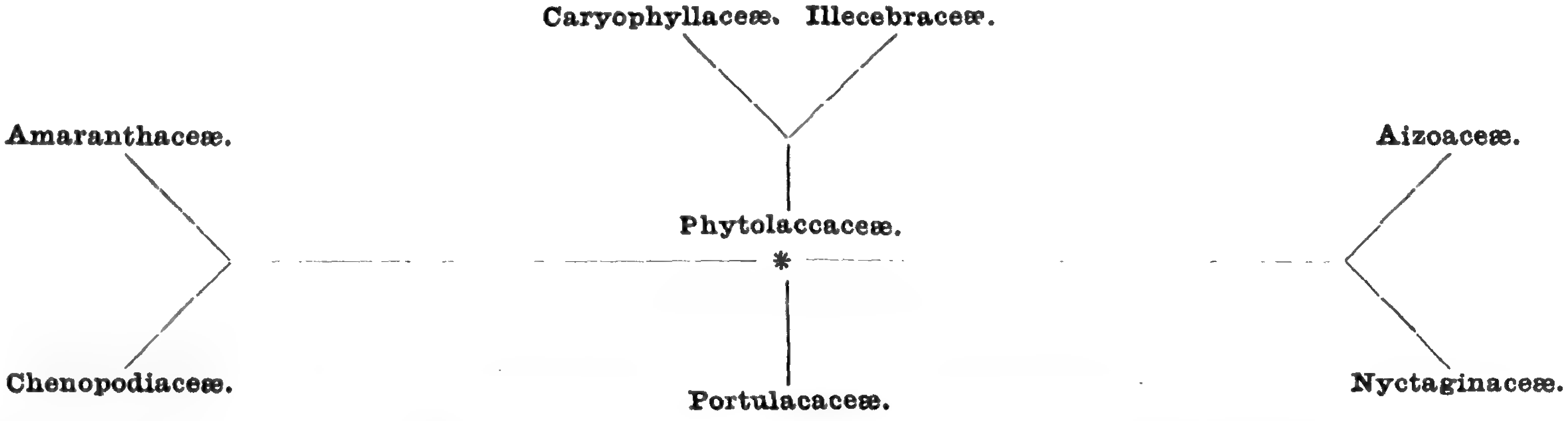
* This, however, is everywhere added in the index, to which reference should be made for the dates.

ORDER—**Caryophyllaceæ.**
SUBORDER—**1. Silenineæ.**
2. Alsinineæ.
3. Polycarpineæ.
TRIBE—**1. Diantheæ.**
2. Sileneæ.
1. Alsineæ.
2. Spergularieæ.
1. Drymarieæ.
2. Polycarpeæ.
SUBTRIBE - **1. Gypsophiloideæ.**
2. Silenoideæ.

The following diagram is intended to show the affinities of *Caryophyllaceæ* with other natural orders:—


Caryophyllaceæ.
Illecebraceæ.
Amaranthaceæ.
Aizoaceæ.
Phytolaccaceæ.
*
Chenopodiaceæ.
Portulacaceæ.
Nyctaginaceæ.

SILENE.

Herbæ annuæ, biennes vel perennes suffruticesve. Radix simplex vel ramosa, perpendicularis vel obliqua, in perennibus crassa, lignosa, rhizoma repens sæpe formans, caules foliosos et floriferos emittens. Caulis altitudine valde varians, teres vel raro nervo foliorum mediano decurrente triangulatus, glaber vel pubescens vel glandulosus, sæpe præsertim superne viscosus, foliosus aut, foliis inferne in rosulam confertis, aphyllus et apice florifer, raro in foliorum rosulam abbreviatus et tum ramos florigeros lateraliter emittens; simplex et apice tantum flores nonnullos ferens aut plus minus ramosus. Folia integra, sessilia vel basi in petiolum angustata, opposita, decussata, rarissime quasi superposita quaterna, latitudine valde variantia, ovato-lanceolata lanceolatave, linearia vel triquetra interdum pungentia, glabra vel pubescentia. Bracteæ et prophylla herbaceæ, sæpe margine membranaceæ et ciliatæ, vel scariosæ. Inflorescentia racemosa, racemo aut simplici interdum ad florem unum ternosve terminales reducto vel in dichasium plus minus compositum laxum capitatumve transmutato vel altero dichasii ramo abortivo scorpioideo (racemum unilateralem), aut racemo composito ramis racemos simplices vel inferne rursum compositos raro dichasia formantibus, interdum ramis contractis verticillastra fingentibus. Flores hermaphroditi, interdum abortu dioici, plus minus longe pedicellati, erecti, patentes vel nutantes.—Calyx gamophyllus, tubulosus, clavatus, turbinatus vel campanulatus, interdum ampliatus, glaber vel pubescens, umbilicatus vel umbilico destitutus vel infra basin annulo circulari auctus, 5-dentatus, dentibus margine sæpe scariosis ciliatis, 10-20-30-vel 60-nervius, evenius vel nervis anastomosantibus. Petala 5 unguiculata, raro subobsoleta inconspicua, cum staminibus carpophori vel stipitiformis plus minus elongati vel cyathiformis crassi brevis apice inserta, præfloratione aut alternatim contorta aut imbricata, unguibus ciliatis vel glabris, interdum apice dilatatis vel utrinque auriculatis, lamina integra biloba vel bipartita vel interdum multifida, ad faucem biappendiculata bigibbosa squamata vel ecoronata. Stamina 10, petalis alterna 5 majora, opposita 5 unguibus basi cohærentibus minora: filamenta filiformia; antheræ biloculares longitudinaliter introrsum dehiscentes. Ovarium basi triloculare, septis supra placentæ centralis apicem, vel in medio desinentibus, superne uniloculare; ovula plurima amphitropa funiculis distinctis in singulis loculis biseriatim placentis inserta. Styli 3, filiformes vel subclavati, intus papillosi. Capsula chartacea vel crustacea, oblonga, ovata vel subglobosa, basi plus minus trilocularis, apice in dentes duplo stylorum numerum dehiscens. Semina plurima reniformia vel globosa, interdum dorso utrinque alâ undulatâ cincta, levia striolata granulata vel tuberculata: embryo fere annularis vel hemicyclicus, excentricus, albumen farinaceum cingens, raro albumine in seminum alis undulatis incluso; radicula dorsalis.

Silene, *Linn.*, Syst. Nat., ed. I (1735); Gen. Plant., ed. I, p. 132, n. 372 (1737).
Viscago, *Hall.*, Enum. Stirp. Helv., i, p. 373 (1742).
Muscipula, *Rupp.*, Fl. Jenensis (ed. Hall.), p. 125 (1745).
Atocion, *Adans.*, Fam. Pl., ii (1763), p. 254.
Oberna, *Adans.*, *l.c.*, p. 255.
Otites, *Adans.*, *l.c.*, p. 255.
Kaleria, *Adans.*, *l.c.*, p. 506.
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Species in tria subgenera disponuntur:—

I. GASTROSILENE. II. CONOSILENE. III. EUSILENE.

Subgenus I. GASTROSILENE.

Calyx 10-vel 20-nervius, nervis reticulato-venosis, vesicarie inflatus post anthesin semper ampliatus, fructifer a capsulâ remotus. Species erennes.

1. Petala, unguibus superne dilatatis vel auriculatis, bifida, rarius emarginata vel subintegra.

A. Calyx 10-nervius.

a. Folia subulata pungentia.

S. pungens.

b. Folia mutica.

α. Caules florigeri e basi rosulæ foliorum terminalis lateraliter edentes.

S. odontopetala, kubanensis, subuniflora, Brotherana, candicans, araxina, Atkinfijewi.

β. Caules florigeri e foliorum rosulæ medio edentes (sive folia non rosulata).

† Calyx sub anthesi ore aperto.

(1) Petala unguibus ciliatis.

S. nubigena, plutonica.

(2) Petala unguibus glabris.

S. Fabaria, monantha, mongolica, kumaonensis, thebana, fabarioides, cæsia, variegata.

†† Calyx sub anthesi ore contracto.

S. ampullata.

B. Calyx 20-nervius.

a. Petala apice subintegra.

S. procumbens, Pumilio.

b. Petala bifida vel bipartita.

S. Thorei, maritima, glareosa, inflata, commutata, Cserei.

2. Petala, unguibus non auriculatis, fimbriato-multifida.

S. physalodes, fimbriata, campanulata.

Subgenus II. CONOSILENE.

Calyx 20–30-vel 60-nervius, nervis haud anastomosantibus ; fructifer e basi ampliatâ apicem versus attenuatus. Flores in dichasio simplici vel composito dispositi, ramus alter sæpe abbreviatus, alter in latere ramo accessorio auctus, rarius flores solitarii. Herbæ annuæ.

a. Calyx 20-nervius.

S. ammophila, coniflora.

b. Calyx 30-nervius.

α. Capsula carpophoro brevi stipitata.

S. subconica, juvenalis.

β. Capsula sessilis.

† Filamenta pubescentia.

S. lydia, Sartorii, conica.

†† Filamenta glabra.

S. conoidea, multinervia, amphorina.

c. Calyx 60-nervius.

S. macrodonta.

Subgenus III. EUSILENE.

Calyx semper 10-nervius, vel evenius vel nervis anastomosantibus, nunquam vesicarie inflatus, fructifer autem supra carpophorum sæpe a capsulâ maturescente distentus. Inflorescentia valde varians. Species annuæ, biennes, vel perennes.

Sectio i. CINCINNOSILENE.

Flores in cincinnis plus minus laxis (racemis secundis scorpioideis) simplicibus vel geminatis, breviter vel raro longe pedicellati vel subsessiles, interdum primo dichasium simplex vel duplex formantes, dichasii deinde ramis scorpioideis. Herbæ annuæ vel biennes, paucæ perennes.

A. Species annuæ vel biennes.

a. Apterospermæ.

Semina reniformia vel globosa, dorso nunquam alis undulatis marginato.

Series 1. *Dichotomæ.*

Flores in cincinnis geminatis brevissime pedicellati vel subsessiles, primo in dichasio simplici vel duplici, ramis dichasii lateralibus scorpioideis. Calyx evenius, fructifer apice contractus. Herbæ interdum biennes.

a. Semina faciebus plana.

S. lagenocalyx, græca, dichotoma, racemosa.

b. Semina faciebus curvato-excavata.

S. vespertina, disticha.

Series 2. *Scorpioideæ.*

Flores in cincinnis simplicibus; interdum infra florem axis primariæ terminalem unilateraliter ramus scorpioideus evolutus, ita ut stirps dichotoma esse videatur, dichotomia autem nunquam florigera.

A. Semina reniformia, faciebus curvato-excavata, dorso (exc. *S. gallica and S. Giraldii*) obtuse canaliculata.

a. Calyx fructifer apice contractus.

α. Filamenta basi villosa; calyx evenius.

S. gallica.

β. Filamenta glabra.

† Calyx evenius.

S. Giraldii.

†† Calyx striis anastomosantibus.

S. cerastioides, calycina.

b. Calyx fructifer apice non contractus.

α. Filamenta basi villosa.

S. reflexa.

β. Filamenta glabra.

† Capsula oblonga subsessilis.

S. nocturna, brachypetala.

†† Capsula carpophorum bis terve superans, vel fere æquans.

S. remotiflora, obtusifolia, hirsuta, pompeiopolitana, mogadorensis, palæstina, affinis.

B. Semina reniformia valde compressa, faciebus concaviuscula, dorso acute canaliculata.

a. Calycis striæ anastomosantes, vel superne conjunctæ.

α. Calyx fructifer apice contractus.

S. brevistipes.

β. Calyx fructifer apice non contractus.

S. canopica, Kuschakewiczi, setacea, maroccana.

b. Calyx striatus evenius.

α. Calyx fructifer apice contractus.

S. Heldreichii, oxyodonta.

β. Calyx fructifer apice non contractus.

S. Schweinfurthi, arabica, chirensis.

C. Semina reniformia, faciebus plana, dorso plus minus obtuse canaliculata.

a. Calycis evenii nervi pilis basi bulbosis vel squamulis acutis vestiti, calyx fructifer apice contractus.

S. trinervia, scabrida, oropediorum.

b. Calyx glaber vel, si pubescens, pilis basi non bulbosis vestitus.

α. Calyx fructifer apice non contractus.

† Calyx nervis anastomosantibus.

S. micropetala, cisplatensis, imbricata.

†† Calyx evenius.

S. clandestina, discolor, villosa.

β. Calyx fructifer apice contractus.

S. pendula.

D. Semina globosa, dorso convexa, faciebus plano-convexa, undique obtuse tuberculata.

a. Calyx fructifer apice non contractus, evenius.

S. adscendens, littorea.

b. Calyx fructifer apice contractus, striis anastomosantibus.

S. Psammitis.

b. Dipterospermæ.

Semina rotundo-reniformia compressa, faciebus planiuscula, dorso alis duabus undulatis marginato profunde canaliculata. Flores in cincinnis simplicibus vel interdum geminatis.

a. Capsulæ carpophorum puberulum.

S. sericea, glauca, glabrescens, longicaulis.

b. Capsulæ carpophorum glabrum.

S. apetala, decipiens.

B. Species perennes, fruticulosæ.

a. Apterospermæ.

Semina reniformia vel auriformia, dorso nunquam alis undulatis marginato. Flores in cincinnis simplicibus.

A. Caules florigeri e basi rosulæ foliorum terminalis lateraliter edentes.

S. legionensis, atlantica.

B. Caules florigeri terminales, ex rosula foliorum medio edentes (sive folia non rosulata).

a. Calycis dentes elongato-lanceolati acuti.

α. Flores calyce multo brevius pedicellati.

S. Choulettei, Hochstetteri.

β. Flores calyce longius pedicellati.

S. Biafræ.

b. Calycis dentes obtusi, vel raro ovati acuti.

α. Herbæ nunquam cæspitem formantes.

S. Burchellii, primulæflora, crassifolia.

β. Herbæ cæspitem densum formantes.

† Calyx evenius.

S. Mundiana, elegans.

†† Calyx striis bifurcatim conjunctis.

S. ciliata.

b. Dipterospermæ.

Semina rotundo-reniformia, faciebus planiuscula, dorso alis duabus undulatis marginato profunde acute canaliculata. Flores in cincinnis laxis duplicibus vel triplicibus.

S. intrusa.

Sectio ii. DICHASIOSILENE.

Herbæ perennes vel annuæ, paucæ biennes. Flores in dichasio simplici vel plus minus composito, breviter vel longe pedicellati, dichasii ramis æqualibus aut inæqualibus, ramo altero in speciebus nonnullis in florem unum reducto ; interdum flores dichasio contracto capitulum formantes, in speciebus perennibus multis, dichasii flores plerique abortivi, caulis uni-vel biflorus ;—rarissime inter *Brachypodas* flores in racemo simplici paucifloro dispositi.

A. Species perennes, inter *Compactas* paucæ biennes vel annuæ.
  a. Petala unguibus utrinque auriculatis.

Series 1. *Auriculatæ.*

Species alpinæ uni-vel bifloræ, petalorum unguibus utrinque dente obtuso vel acuto auriculatis.

A. Caules florigeri terminales.
  a. Folia subulata vel falcata, interdum pungentia.
    a. Calyx dentibus obtusis.
      † Calyx striis anastomosantibus.

S. falcata, *masmenæa*, *argæa*, *mentagensis*, *rhyncocarpa*, *stentoria*.

      † Calyx evenius.

S. tragacantha.

    β. Calyx dentibus acutis, striis anastomosantibus.

S. Echinus, *subulata*, *pindicola*.

    γ. Calyx dentibus alternatim acutis et retusis, striis apice anastomosantibus.

S. xylobasis.

  b. Folia mutica, recta, haud falcata.
    a. Calyx dentibus obtusis, striis latis rubris superne anastomosantibus.

S. dianthifolia, *Orphanidis*, *Sargenti*, *humilis*, *tachtensis*, *Grayi*, *Watsoni*, *Suksdorfii*.

    β. Calyx dentibus acutis.
      † Calyx striis anastomosantibus.

S. commelinifolia, *Schlumbergeri*, *Moorcroftiana*, *persica*.

      †† Calyx evenius.

S. brevicaulis.

B. Caules florigeri e foliorum rosulâ terminali lateraliter adscendentes. Calyx striis anastomosantibus.

S. Boryi, *melandrioides*, *caucasica*, *vallesia*.

  b. Petala unguibus exauriculatis.

Series 2. *Macranthæ.*

Species 1–3-floræ, floribus breviter raro longe pedicellatis; aut flores in dichasio duplici, aut dichasii ramo altero abbreviato in foliorum axillis geminati, calyce brevius pedicellati; calyx elongato-clavatus seu in speciebus paucis uni-vel biflorus, floribus longe pedicellatis, breviter clavatus.

A. Caules e foliorum rosulâ terminali lateraliter edentes.

S. palinotricha, Schafta, pygmæa, longitubulosa, heterodonta, parvula, cæspitosa.

B. Caules florigeri terminales.

a. Capsula globosa carpophoro ter quaterve superata.

S. depressa, Porteri.

b. Capsula carpophorum æquans vel plus minus superans.

α. Calyx evenius.

† Capsula carpophorum æquans.

S. succulenta, Uhdeana, papillifolia, thymifolia, microphylla, burmanica, cretacea, infidelium.

†† Capsula carpophorum bis quaterve superans.

S. arguta, sisianica, gracillima, Schmuckeri, khasiana, vagans.

β. Calyx striis anastomosantibus.

† Calyx dentibus obtusis.

S. oreophila, Aucheriana, nurensis, capillipes, Campanula, Saxifraga, Barbeyana.

†† Calyx dentibus alternatim acutis et obtusis.

S. fruticulosa, filipes.

††† Calyx dentibus acutis.

S. multicaulis, macropoda, incurvifolia, acutifolia, fœtida, Maximowicziana, cordifolia, lazica.

Series 3. *Nanosilene.*

Species nanæ unifloræ; calyx campanulatus.

S. acaulis, Baumgarteni.

Series 4. *Brachypodæ.*

Species montanæ caulibus strictis; flores solitarii vel bini, longissime pedicellati, vel in dichasio simplici laxo; calyx sub anthesi clavatus, fructifer oblongus; capsula carpophorum multies raro tantum bis superans.

a. Caules florigeri e basi rosulæ foliorum terminalis lateraliter edentes.

S. grisea, leptoclada.

b. Caules e foliorum rosulæ medio edentes (terminales).

a. Flores solitarii vel bini, longissime pedicellati.

S. flavescens, monerantha, flammulæfolia.

β. Flores in dichasio laxo quasi pseudoracemosi.

S. thessalonica, macronychia, yemensis, japonica.

Series 5. *Brachyanthæ.*

Species montanæ inflorescentiâ dichasiiformi valde compositâ; calyx vel obconicus vel breviter clavatus et tum hyalinus.

a. Calyx obconicus.

S. rupestris, Menziesii, cryptopetala.

b. Calyx hyalinus, breviter clavatus basi truncatus.

S. Tatarinowii, macedonica, Lerchenfeldiana.

Series 6. *Compactæ.*

Species annuæ, biennes, vel perennes. Flores in dichasio plus minus denso contracto, capituliformi, brevissime pedicellati; calyx membranaceus glaber, nervis apice bifurcatim conjunctis; petala integra vel emarginata.

S. Armeria, compacta, Reuteriana, Asterias.

B. Species annuæ.

a. Inflorescentiæ rami valde inæquales, altero in florem unum reducto, ita ut flores in foliorum axillis geminati esse videantur; interdum inflorescentia superne scorpioidea.

Series 7. *Nicæenses.*

a. Calyx fructifer apice contractus.

S. ramosissima, cinerea.

b. Calyx fructifer apice non contractus.

S. Kremeri, cirtensis, nicæensis.

b. Flores in dichasio composito regulari, ramis æqualibus vel raro paullum inæqualibus.

Series 8. *Atocia.*

Calyx fructifer apice non contractus. Semina faciebus curvato-excurvata, vel subglobosa profunde umbilicata.

a. Semina faciebus curvato-excurvata.

a. Semina dorso tuberculorum seriebus 3 ornato, plano-convexa medio leviter canaliculata.

S. fuscata, Pseudo-Atocion.

β. Semina dorso obtuse canaliculata.

† Calyx evenius.

S. divaricata, rubella, Bergiana, turbinata, segetalis.

†† Calyx nervis anastomosantibus.

S. argillosa.

b. Semina subglobosa tuberculata profunde umbilicata. Calyx nervis anastomosantibus.

S. ægyptiaca, virescens, atocioides, mekinensis, delicatula, insularis.

Series 9. *Rigidulæ.*

Calyx fructifer apice non contractus. Semina faciebus plana.

A. Semina dorso utrinque alâ undulatâ ornato, canaliculata.

S. nana.

B. Semina dorso plana.

a. Capsula carpophorum bis superans.

S. Hussoni.

b. Capsula carpophorum æquans vel paullum superans.

S. rigidula, echinosperma, juncea.

c. Capsula carpophoro bis terve superata.

S. portensis.

C. Semina dorso canaliculata, margine haud alata.

a. Capsula carpophoro 3–4-plo superata.

S. reticulata.

b. Capsula carpophorum æquans.

α. Filamenta villoso-ciliata.

S. Kotschyi, intricata.

β. Filamenta glabra.

S. cariensis, integripetala, laconica, arenosa, linearis.

c. Capsula carpophorum 2–4-plo superans.

α. Flores laterales calyce brevius pedicellati.

S. chætodonta, striata.

β. Flores laterales calyce longius pedicellati.

† Petala e calyce exserta..

S. pinetorum, sedoides, pentelica, Haussknechtii.

†† Petala tota in calyce occulta sive nulla.

S. inaperta.

Series 10. *Leiocalycinæ.*

Calyx fructifer apice contractus. Calyx glaber vel brevissime scabriusculus, vel raro glanduloso-pubescens.

a. Calyx evenius.

α. Calyx dentibus acutis.

S. cretica, Ungeri, grandiflora.

β. Calyx dentibus obtusis.

S. antirrhina, lævigata, Boissieri.

b. Calyx nervis anastomosantibus.

a. Calyx dentibus acutis.

S. Almolæ, Muscipula, Reinholdi, stricta, tenuiflora.

β. Calyx dentibus obtusis.

S. Behen, Holzmanni, linicola, crassipes.

Series 11. *Lasiocalycinæ.*

Calyx fructifer apice contractus. Calyx evenius, valde costatus, costæ pilis longis vel squamis distinctis vestitæ.

a. Petala integra vel emarginata.

S. gonocalyx, pteroneura.

b. Petala bifida vel bipartita.

S. papillosa, echinata, squamigera, vesiculifera.

Sectio iii. BOTRYOSILENE

Herbæ perennes suffruticesve. Flores in racemo simplici vel composito, breviter vel longe pedicellati: racemi ramis aut brevibus paucifloris, aut elongatis iterum racemosis vel cymuliferis vel, omnibus cymarum internodiis abbreviatis, verticillastriferis; interdum axis primariæ intra inflorescentiam flores internodiis contractis capitulum formantes; caulis raro abortu tri-vel uniflorus.

A. Calyx glaberrimus coriaceus, cylindrico- vel conico-clavatus, sæpe basi annulo circulari pseudoumbilicatus.

Series 1. *Sclerocalycinæ.*

a. Pedicelli imâ basi bibracteolati.

S. Friwaldzkyana.

b. Pedicelli medium versus vel infra calycem bibracteolati.

a. Filamenta glabra.

† Flores erecti.

(1) Calyx dentibus omnibus acutis vel mucronatis.

S. bupleuroides, avromana, caramanica, Rouyana, macrosolen, tenuicaulis, megalocalyx, Parrowiana.

(2) Calyx dentibus alternatim obtusis et acutis, albomarginatis ciliatis.

a. Folia glabra.

S. chloræfolia, longiflora, staticifolia, cæsarea, laxa, peduncularis, armena.

β. Folia serrulato-scabra.

S. serrulata.

(3) Calyx dentibus omnibus ovatis obtusis, albomarginatis ciliatis.

S. Balansæ.

†† Flores cernui.

(1) Calyx dentibus omnibus acutis vel obtusis.

S. struthioloides, Manissadjiani.

(2) Calyx dentibus alternatim acutis et obtusis albomarginatis.

S. libanotica.

β. Filamenta ciliata.

† Flores erecti.

S. radicosa, tunicoides.

†† Flores cernui.

S. oligantha.

B. Calyx membranaceus, rarissime coriaceus simulque pubescens, basi truncatus vel umbilicatus.

a. Flores in racemis simplicibus, axis primariæ internodiis nunquam abbreviatis, racemi ramis brevibus oppositis interdum altero abortivo, alterius omnibus unifloris vel interdum inferioribus 3-7-floris et superioribus tantum unifloris.

Series 2. *Chloranthæ.*

Pedicelli imâ basi binis prophyllis præditi. Petala bipartita, raro retusa.

A. Petala bipartita vel bifida.

a. Capsula carpophorum 2–4-plo superans; calyx glaberrimus, raro glanduloso-pubescens.

S. chlorantha, tatarica, foliosa, tenuis, Douglasii, Macounii, lychnidea, Reichenbachii.

b. Capsula carpophorum æquans.

S. linifolia, genistifolia, turgida.

B. Petala retusa.

S. scaposa.

Series 3. *Suffruticosæ.*

Pedicelli medium versus seu apice binis prophyllis præditi. Petala integra, bipartita vel rarius laciniato-quadripartita.

A. Petala integra vel bipartita.

a. Capsula carpophoro superata.

S. nodulosa, goniocaula.

b. Capsula carpophorum æquans, rarissime eo sesquilongior.

a. Calyx coriaceus, petala unguibus glabris.

† Petala bipartita, unguibus auriculatis.

S. eriocalycina, caspica, hirticalyx.

†† Petala linearia integra.

S. leptopetala.

β. Calyx membranaceus.

† Petala unguibus ciliatis.

S. petræa, lineata.

†† Petala unguibus glabris.

S. Montbretiana, brahuica, Urvillei.

c. Capsula carpophorum bis terve superans, vel subsessilis.

a. Folia pungentia ; semina dorso faciebusque plana.

S. altaïca.

β. Folia mutica ; semina dorso canaliculata, faciebus plana.

† Calyx glaberrimus.

S. lithophila, tenella.

†† Calyx pubescens.

(1) Ungues et filamenta glabra.

S. canariensis, nocteolens.

(2) Ungues et filamenta ciliata.

S. stenobotrys, Semenovii.

B. Petala laciniato-quadripartita.

S. odoratissima.

b. Flores in racemo simplici vel composito verticillastrifero, aut, axis primariæ internodiis intra inflorescentiam abbreviatis, capitulum formantes ; (rarissime racemus non contractus pauciflorus, sed tum calyx brevis obconicus et ungues ciliati).

Series 4. *Capitellatæ.*

Flores in racemo simplici, axis primariæ internodiis abbreviatis, contracto capituliformi, rarissime in racemo paucifloro non contracto ; calyx brevis turbinatus vel oblongo-campanulatus, evenius ; ungues ciliati.

A. Petala unguibus auriculatis.

S. Aristidis, citrina.

B. Petala unguibus edentulis.

a. Petala bipartita.

† Filamenta glabra.

S. pharmaceifolia, cephalantha, dianthoides.

†† Filamenta ciliata.

S. Rœmeri, olympica.

β. Petala integra lineari-spathulata.

S. capitellata.

Series 5. *Otiteæ.*

Flores in racemis simplicibus vel compositis verticillastriferis; pedicelli imâ basi binis prophyllis prædíti.

A. Petala integra raro leviter emarginata, ecoronata.

a. Capsula sessilis.

S. Sendtneri, Otites.

b. Capsula carpophorum bis-quater superans vel fere æquans.

S. andryalæfolia, holopetala, sibirica, Falconeriana, Gebleriana.

B. Petala bipartita.

a. Capsula carpophorum subæquans.

S. multiflora, cephalenia.

b. Capsula carpophorum 3–4-plo excedens.

S. gigantea, congesta, Bridgesi, yunnanensis.

Series 6. *Spergulifoliæ.*

Flores in racemis simplicibus compositisve, verticillastra plus minus densa interdum pauciflora ferentibus; pedicelli medio seu apice binis prophyllis prædíti.

A. Petala multifida, lobis lateralibus brevibus.

S. pachyrrhiza, Olgæ.

B. Petala bipartita vel bifida.

a. Capsula carpophorum æquans vel fere bis superans.

S. repens, spergulifolia, Bornmuelleri, supina.

b. Capsula subsessilis; flores dioici.

S. pruinosa, brachycarpa, cappadocica.

c. Flores in racemo composito, ramis racemosis sive dichasia composita ferentibus, aut in racemo simplici ramis strictis uni-vel paucifloris elongatis; (rarissime in formis alpinis caulis uni-vel pauciflorus).

Series 7. *Lasiostemones.*

Flores erecti vel nutantes. Petalorum ungues et filamenta lanuginoso-ciliata.

a. Petala unguibus exauriculatis.

S. affghanica, puberula, Niederi, longipetala, kunawarensis.

b. Petala unguibus auriculatis ; flores nutantes.

α. Ungues dente obtuso auriculati.

S. Marschalli, *saxatilis*, *aprica*, *Pringlei.*

β. Ungues dente acuto auriculati.

S. Scouleri.

Series 8. *Nutantes.*

Flores nutantes. Petalorum ungues et filamenta glabra.

a. Calyx basi sensim in petiolum attenuatus.

S. leucophylla, *amana*, *viridiflora.*

b. Calyx truncatus basi umbilicatus.

α. Petala unguibus exauriculatis.

S. mellifera, *Catholica*, *nivea*, *stellata*, *nutans*, *longicilia*, *velutinoides.*

β. Petala unguibus auriculatis.

S. otodonta, *Spaldingii*, *Galatœa.*

Series 9. *Italicæ.*

Flores erecti. Ungues glabri vel ciliatuli, filamenta glabra.

A. Ungues ciliatuli.

S. splendens, *italica*, *pseudo-nutans*, *nemoralis*, *spinescens*, *Tanakæ*, *Sieberi.*

B. Ungues glabri.

a. Capsula carpophoro sesqui-vel duplo brevior.

S. Schwarzenbergeri, *Fenzlii*, *Fortunei.*

b. Capsula carpophorum bis terve superans.

α. Petala multifida.

S. ovata.

β. Petala bifida.

S. nevadensis, *rhodopea*, *Skorpili*, *Behrii*, *Luisana*, *pectinata*, *Lyallii*, *phrygia*, *eremitica.*

γ. Petala integra.

S. lanceolata, *Alexandri.*

c. Capsula carpophorum æquans, vel eo sesqui-longior.

α. Calyx striis anastomosantibus.

S. pauciflora, *Salzmanni*, *fruticosa*, *rosulata*, *mollissima.*

β. Calyx evenius.

S. gibraltarica, *hifacensis*, *paradoxa.*

Subgenus I. GASTROSILENE.

Calyx 10-vel 20-nervius, nervis reticulato-venosis, vesicarie inflatus et post anthesin semper ampliatus, fructifer a capsulâ remotus. Species perennes.

I. Petala, unguibus superne dilatatis vel auriculatis, bifida rarius emarginata vel subintegra.

A. Calyx 10-nervius.

a. Folia subulata pungentia.

1. **Silene pungens**, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 32; *Rohrb.*, *Monogr.*, p. 77.

Hab. Turkish Armenia; Mt. Olympus, and Mt. Tech-Dagh, near Erzeroum; also near Erzinghan, westward of Erzeroum (*Sintenis*, It. Orientale, 1889).

b. Folia mutica.

α. Caules florigeri e basi rosulæ foliorum terminalis lateraliter edentes.

2. **S. odontopetala**, *Fenzl*, *Pugill. Pl.*, p. 9, n. 28 (1842); *Rohrb.*, *Monogr.*, p. 78.

α. genuina, *Rohrb.*, *l.c.*

Caules humiles, interdum foliorum rosulam vix excedentes, cum calyce glanduloso-pubescentes. Folia lanceolata vel lineari-lanceolata acuminata scabrida vel glandulosa. Flores pauci interdum solitarii.

β. cerastiifolia, *Boiss.*, *Fl. Orient.*, i. p. 626.

γ. latifolia, *Boiss.*, *l.c.*

Syn. S. physocalyx, *Ledeb.*, *Fl. Ross.*, i. p. 321.
S. odontopetala *var.* physocalyx, *Rohrb.*

δ. congesta, *Boiss.*, *l.c.*

Syn. S. Sinaica, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 25.
S. odontopetala *var.* sinaica, *Rohrb.*
S. Raddeana, *Trautv. in Act. Hort. Petrop.*, ii. (1873) p. 472.

Geogr. limits.—*N.* The Western Caucasus (*var.* γ).
S. St. Catherine's Peak, on Mt. Sinai (*var.* δ).
E. Mt. Elburz, in N. Persia (*var.* γ).
W. Mt. Ak-Dagh, in Anatolia (*var.* β).

3. SILENE KUBANENSIS, *Somm. et Lev. in Act. Hort. Petrop.*, xiii. (1893) p. 37.

Caules cæspitosi glanduloso-pubescentes inferne glabriusculi numerosi foliosi adscendentes, plus minus laxe ramoso-racemosi rarius uniflori, virescentes, basi vaginis foliorum induratis persistentibus sæpe dense obsiti. Folia uninervia acuta apiculata, radicalia et rosularum sterilium lanceolata oblonga vel subspathulata in petiolum attenuata, caulina angustiora acutiora; bracteæ submembranaceæ glanduloso-pubescentes; inferiores lanceolatæ acutæ, superiores ovato-oblongæ obtusæ. Flores plerumque breviter pedicellati. Calyx a basi parum dilatatus cylindricus vel elongate obconicus subumbilicatus glanduloso-pubescens membranaceus pallide virens vel dilute purpurascens, dentibus ovatis obtusissimis margine hyalinis ciliatis. Petala supra albida, subtus virescenti-livida, ultra medium bipartita, lobis linearibus obtusis, appendicibus brevibus semi-orbicularibus, unguibus glabris vel superne ciliatis. Filamenta glabra. Capsula ovata vel elliptico-oblonga, carpophoro dense retrorsum hispido plerumque sesquilongior. Semina fusco-grisea reniformia granulata, faciebus plana, dorso canaliculata.

A *S. odontopetala* differt, colore viridi, indumento minus denso, caulibus sæpe a basi ramosis, et præsertim calyce longiore dentibus rotundatis.

Hab. In the mountainous district of Kuban, in the Western Caucasus, prov. of Cis-Caucasia.

4. S. SUBUNIFLORA, *Somm. et Lev. in Act. Hort. Petrop.*, xiii. (1893) p. 39.

Caules cæspitosi glanduloso-pubescentes, basi interdum glabriusculi superne parce foliati adscendentes, uniflori rarius biflori. Folia uninervia glanduloso-ciliata, radicalia et rosularum sterilium anguste lanceolata acuta rarius spathulata et apice rotundata, caulina angusta lanceolato-linearia vel linearia fere subulata; bracteæ membranaceæ nunc lineari-lanceolatæ, nunc ovatæ acutæ. Flores nutantes, pedunculis brevibus. Calyx in alabastro late cylindricus, in flore evoluto obovato-campanulatus, subumbilicatus glanduloso-pubescens, membranaceus purpurascens, striis viridi-livescentibus vel saturate purpureis, dentibus obtusis membranaceis. Petala livida ultra medium bipartita, lobis divaricatis rotundatis, appendicibus oblongis vel lineari-oblongis, unguibus glabris vel superne ciliatis. Filamenta glabra. Capsula ovata vel elliptico-oblonga, carpophoro dense retrorsum hispido plerumque sesquilongior. Semina faciebus plana, dorso canaliculata.

A præcedenti valde discrepat, caule scapiformi (nunquam ramoso) et parce folioso, calyce saturatius colorato latiore, formâ petalorum, appendicibus duplo longioribus. *S. ciliata*, cujus specimina pauciflora quoad habitum nostris simillima, recedit defectu glandularum, caule rarius unifloro, calyce angustiore basi attenuato non umbilicato.

Hab. In the mountainous district of Kuban, in the Western Caucasus, prov. of Cis-Caucasia.

5. SILENE BROTHERANA, *Somm. et Lev. in Act. Hort. Petrop.*, xiii. (1893) p. 36.

Caules basi suffrutescentes retrorsum tomentelli grisei numerosi adscendentes, axillis fasciculiferis. Folia breviter lanceolato-linearia mucronulata recurva apicem versus latiora, basi præsertim ciliata ceterùm glabrescentia; bracteæ foliaceæ latiusculæ ovatæ acuminatæ. Cymulæ 3–6-floræ pedunculatæ, plurimæ oppositæ, in racemum interruptum dispositæ vel apice caulis subcapitatæ. Calyx cylindrico-conicus glanduloso-hirsutus umbilicatus, fructifer ovatus basi vix angustatus nervis valde prominentibus costatus, dentibus ovatis obtusis apice ciliatis conniventibus. Petala alba bipartita, unguibus exsertis glabris, lobis linearibus, appendicibus binis brevibus ovatis obtusis. Filamenta glabra. Capsula ovato-conica sub lente corrugata, carpophorum retrorsum pubescens æquans. Semina reniformia, fusca, obtuse tuberculata, faciebus plana, dorso canaliculata.

Characteribus, *S. spergulifoliam* et *S. pruinosam*, Boiss., revocat, primo intuitu autem dignoscitur calyce ampliato et evidenter a capsulâ remoto, ergo inter species subgeneris *Eusilene* (sectionis *Botryosilene*) enumerari non possit. A *S. spergulifolia* insuper differt, foliis latioribus et brevioribus, capsulâ parvâ; a *S. brachycarpa*, Boiss. et Bal., præterea capsulâ non abrupte conico-rostratâ, carpophoro tenui magis elongato.

Syn. S. spergulifolia (non *Bieb.*) in *Brotherus*, exsicc. (1881), n. 138 bis.

Hab. In the mountainous district of Azchur, in the Western Caucasus, prov. of Cis-Caucasia.

6. S. CANDICANS, *Čelak. in Oesterr. Bot. Zeitschr.* (1876), p. 321 *Boiss., Fl. Orient., suppl.*, p. 100.

Caules cæspitosi eglanduloso-pubescentes, erecti vel suberecti, simplices, parce foliosi, 16–21 centim. longi, basi foliolis parvis in squamas vergentibus densioribus cincti. Folia rosularum sterilium obovato-spathulata acuminata in petiolum longum attenuata, caulina spathulato-oblonga longius acuminata, dense pubescenti-tomentella canescentia; bracteæ et prophylla ovatæ acutæ candicantes. Inflorescentia cymosa 7–10-flora, cymis trifloris in summo caulis approximatis confertis, vel cymâ infimâ triflorâ axillari remotâ; flores breviter pedicellati. Calyx campanulatus, albidus vel livide subcoloratus, molliter tomentosus, dentibus late triangularibus acuminatis. Petala alba, unguibus utrinque obtusiuscule auriculatis glabris; lamina oblonga bifida bigibbosa lobis lineari-oblongis. Capsula subglobosa, carpophorum fere æquans. Semina dorso tuberculato convexa.

Hab. Syria; Zebdaine, near Damascus.

7. SILENE ARAXINA, *Trautv. in Act. Hort. Petrop.*, iii. pars II. (1875) p. 278; *Boiss.*, *Fl. Orient.*, *suppl.*, p. 101.

Caules sive rami florigeri numerosi glandulosi foliosi, 30 centim. longi. Folia glandulosa uninervia, radicalia anguste oblonga in petiolum attenuata, caulina majora late oblonga, bracteæ et prophylla ovato-lanceolatæ. Cyma dichotoma multiflora floribus coarctatis. Calyx albidus glanduloso-pubescens, fructifer subclavatus, dentibus ovatis acuminatis. Petala albida, unguibus utrinque obtusiuscule auriculatis, laminâ bilobâ, appendicibus obtusis. Capsula carpophoro vix longior. Semina dorso canaliculata bicarinata minute tuberculata, faciebus plana levia.

Hab. Turkish Armenia; along the R. Aras, in the district of Erzeroum.

8. S. AKINFIJEWI, *Schmalh.*, *Neue Pfl. aus Kaukasus, in Ber. Deutsch. Bot. Gesellsch.* (1892), p. 286.

Caules humiles glanduloso-pubescentes. Folia ovata acuta; bracteæ herbaceæ. Inflorescentia terminalis cymosa, cymis 2–4-floris; pedicelli calyci æquilongi vel duplo longiores. Calyx albidus oblongus, dentibus triangulari-oblongis obtusis. Petala alba bifida ecoronata. Capsula carpophorum ter superans.

A *S. odontopetalâ* differt foliis multo latioribus, pedicellis longioribus, dentibus calycinis obtusiusculis.

Hab. In the Central Caucasus, on the Harves glacier.

β. Caules florigeri e foliorum rosulæ medio edentes (sive folia non rosulata).

† Calyx sub anthesi ore aperto.

(1) Petala unguibus ciliatis.

9. **Silene nubigena**, *Phil. in Anal. Univ. Chil.* (1862), II. p. 378; *Rohrb., Monogr.*, p. 80.
Hab. Chile.

10. **S. plutonica**, *Naudin, in C. Gay, Fl. Chil.*, i. p. 258; *Rohrb., Monogr.*, p. 80.
Hab. Chile.

In the specimens in Herb. Kew., the leaves are 1-nerved, the stems appear to be unifloral, and the capsule is scarcely three times as long as the carpophore.

(2) Petala unguibus glabris.

11. **S. Fabaria**, *Sibth. et Sm., Fl. Græcæ Prodr.*, i. p. 293; *Fl. Græca*, v. t. 415.

Geogr. limits.—*N.* Near Odessa, in prov. Kherson.
S. Island of Samos, in the Turkish Archipelago.
E. Ghemlek, in prov. Siwas.
W. Island of Cephalonia, Ionian Isles.

12. **S. monantha**, *S. Wats. in Proc. Amer. Acad.*, x. (1875) p. 340; *B. L. Robinson, l.c.*, xxviii. (1893) p. 145 (S. Douglasii *var.* monantha).

Caulis tenuis laxe assurgens ramosus glaber. Folia anguste oblanceolata longe acuminata basi breviter ciliata. Flores solitarii longe pedunculati erecti. Calyx campanulatus puberulus superne reticuloso-venosus, dentibus triangularibus acutiusculis albo-marginatis subciliatis. Petala alba vel pallide rosea, unguibus anguste auriculatis longe exsertis, bifida lobis late ovatis, appendicibus lanceolatis integris dimidiam laminam æquantibus. Filamenta glabra. Capsula oblonga longe stipitata.

Geogr. limits.—W. United States.
N. and *W.*—Castle Rock, Cascade Mountains, Washington Territory.
S. Webber Lake, California (*Lemmon*, ex Proc. Amer. Acad., xxviii. [1893] p. 145).
E. N. Utah (*Parry*, ex Proc. Amer. Acad., xxviii. [1893] p. 145).

13. Silene mongolica, *Maxim., Enum. Pl. Mongol.*, p. 88, t. 13 (1889).

Caules cæspitosi basi suffruticosi griseo-virides minute puberulo-scabri. Folia cartilagineo-apiculata, inferiora conferta basi attenuata lineari-lanceolata obtusiuscula, cetera linearia mucronata. Flores sub anthesi vix cernui, postea stricte erecti in dichasio 1–2-rarius 3-floro dispositi, pedicellis quam calyx longioribus. Calyx inflato-cylindricus, fructifer late clavatus, umbilicatus, dentibus subcordatis late hyalino-marginatis. Petala angusta emarginata, unguibus exsertis, appendicibus binis ovoideis. Capsula ellipsoidea carpophorum bis superans. Semina tuberculata, dorso plano-convexa, faciebus concaviuscula.

Hab.—Northern Gobi; Mt. Tostu (1886).

A species anomalous in habit, perhaps a connecting link between this and the next subgenus.

14. S. kumaonensis, *sp. nov.*

Caules adscendentes ramosi hirtello-pubescentes. Folia acuminata, inferiora lineari-lanceolata, caulina lanceolata, bracteæ foliis conformes. Flores in caule distantes, laxe subdichotomi, longe pedunculati. Calyx membranaceus ovato-campanulatus umbilicatus scabrido-puberulus, dentibus lanceolatis acutis ciliolatis. Petala viridula angusta bifida, lobis oblongo-linearibus. Capsula ovata carpophorum glabrum ter quaterve superans. Semina seriatim tuberculata, dorso lato convexa, faciebus excavata. (*Herb. Kew*, coll. J. F. Duthie, n. 5366.)

Hab. Dhauli Valley, Kumaon (1886).

15. S. thebana, *Orph. in Boiss., Fl. Orient.*, i. p. 627; *Rohrb., Monogr.*, p. 81.

A *S. Fabariâ* diversa foliis dissitis, petalis ob coronam amplam veluti 4-partitis.

Hab. Near Thebes (Thivæ), in Greece.

16. S. fabarioides, *Haussk. in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 47.

Caules arcuato-adscendentes glaucescentes glabri. Folia carnosula glaucescentia basi breviter connata glabra oblongo-lanceolata basin versus subangustata, superiora minora elliptico-lanceolata acuta. Cymæ ramis inæqualibus dichotomæ: flores subcernui laxe racemosi, alares longiuscule pedunculati. Bracteæ lanceolatæ acutæ membranaceæ. Calyx glaber ovoideo-inflatus umbilicatus, nervis viridibus vel erubescentibus, dentibus late triangularibus acutis. Petala alba bipartita, lobis spathulatis, appendicibus bifidis. Capsula ovoidea carpophorum ter quaterve superans. Semina tuberculato-rugosa.

S. Fabariæ affinis, quæ planta maritima surculis sterilibus dense foliosis, caulibus minus dichotome-ramosis, foliis inferioribus obovatis mucronatis crassioribus marginibus exasperatis, calyce minus inflato breviore et vix venuloso, differt; a *S. thebana* vix diversa.

Hab. The peak of Zygos, in Greece, *Haussknecht* (1885).

17. Silene cæsia, *Sibth. et Sm., Fl. Græcæ Prodr.*, i. p. 294; *Fl. Græca*, v. p. 12, t. 417; *Rohrb., Monogr.*, p. 82.

Geogr. limits.—*N.* and *W.* Mt. Velugo, in Livadia.
S. Mt. Chelmos, in Morea.
E. Island of Khio, in the Turkish Archipelago.

18. S. variegata, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 82; *Desf., Cor. Tourn.*, p. 74, t. 56 (Lychnis); *Rohrb., Monogr.*, p. 82.

A præcedenti distincta caulibus ad scapos pumilos reductis, floribus majoribus, petalorum lobis latioribus.

Geogr. limits.—*N.* Mt. Parnassus, in Livadia. *S.* Crete.

†† Calyx sub anthesi ore contracto.

19. S. ampullata, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 26; *Rohrb., Monogr.*, p. 82.

Hab. Turkish Kurdistan.

B. Calyx 20-nervius.

a. Petala apice subintegra.

20. S. procumbens, *Murr. in Comm. Gotting.*, vii. (1784) p. 83, t. 2; *Rohrb., Monogr.*, p. 83.

Adde: Folia lanceolata acuminata subtrinervia, nervo mediano prominente, nervis lateralibus inconspicuis incompletis.

β. ochotensis, *Wright, in Herb. U.S. North Pacific Explor. Exped.* (*ined.*).

Caules plus minus cæspitoso-adscendentes pubescenti-scabri. Folia scabra trinervia, nervis conformibus. Calyx campanulatus, dentibus ovato-rotundis.

In all the specimens I have examined at Herb. Kew. and Herb. Mus. Brit., the leaves are acuminate and lanceolate rather than oblong-lanceolate, as stated by Rohrbach, and the midrib is prominent, and the two lateral nerves very faint: in the variety the three nerves are distinct, and the midrib is not more prominent than the lateral nerves.

Geogr. limits.—*N.* Along the R. Irtysch, near Semipalatinsk, Siberia.
S. Desert of Soungaria, Central Asia.
E. Coast of Okhotzk, Siberia (*var.* β).
W. Banks of the R. Moskwá, in Central Russia (*Clerc, ex Nym., Consp. Fl. Eur., suppl.*, ii. p. 51).

21. SILENE PUMILIO, *Wulf. in Jacq. Fl. Austr.*, v. *App.*, p. 26, t. 2 (1778); *Linn., Mant. Pl.*, i. (1767), p. 71 (Cucubalus); *Tanfani, in Parl. Fl. Italiana*, ix. p. 327 (Saponaria).

Caules cæspitosi simplices triarticulati glabri. Folia cum bracteis linearia obtusa ciliata, basin versus attenuata. Flores solitarii graciliter pedicellati. Calyx oblongo-campanulatus umbilicatus, pubescens pilis patentibus mollibus longis, eglandulosus, membranaceus, viridis totus et viridi violaceus, fructifer ellipsoideus ore late apertus 18–22 mm. longus; tenuissime reticuloso-venosus, nervis tenuibus commissuralibus subobsoletis; lobis ovatis obtusis rotundatis ciliolatis. Petala indivisa, unguibus inclusis, appendicibus setaceis. Capsula ovato-cylindrica subsessilis carpophoro glaberrimo. Semina dorso obtuse canaliculata, faciebus plana marginata, levia.

This plant has been shifted about from one genus to another, chiefly on account of the presumed absence of commissural nerves. It would be very inconvenient to include it in *Saponaria* owing to its 3-styled ovary. The nervation of the calyx is at best very faint and indistinct, but the rudiments of commissural nerves at the base, especially on the inner surface, is clearly demonstrable, and quite as apparent as the interlacing of the individual nerves. Taking into consideration its general habit and other characters, it is therefore reasonable to refer the species to the genus in which it was placed by Wulfen. The species is usually included in the principal Italian floras, but all the localities given are now in Austrian territory.

Syn. S. pumila, *St. Lag. in Ann. Soc. Bot. Lyon*, vii. (1880) p. 135.

Geogr. limits.—*N.* Moravia. *E.* Transylvania.
S. Carniola. *W.* Tyrol.

b. Petala bifida vel bipartita.

22. **Silene Thorei**, *Duf. in Ann. Sci. Nat.*, Sér. I. v. (1825), p. 84; *Reichb., Ic. Fl. Germ. Helv.*, n. 5120 (S. inflata *var.* glauca); *Rohrb., Monogr.*, p. 83.

Adde: Planta cæspitosa glauca, floribus sub anthesi cernuis. Petala bicallosa (appendicibus non instructa).

Geogr. limits.—*N.* Depart. of Basses-Pyrénées, on the coast between Bayonne and Biarritz.
S. and *E.* Catalonia (*Vayreda, ex Nym., Consp. Fl. Eur., suppl.*, ii. p. 51).
W. San Sebastian, in prov. of Biscay (*Lange, in Prodr. Fl. Hisp.*, iii. p. 670).

23. S. maritima, *With., Bot. Arr. Brit. Pl.*, ed. III. ii. p. 414 (1796); *Syme, Engl. Botany*, ed. III. ii. p. 57, t. 200; *Rohrb., Monogr.*, p. 84.

Adde syn. S. Bastardi, *Bor. in Bull. Soc. Dauph.* (1888), p. 64.
S. amœna, *Hill, Veg. Syst.*, xiii. p. 55.

—forma angustifolia.

Syn. S. stenophylla, *Plan., Fl. Gall.*, p. 121.
S. maritima *var.* angustifolia, *J. Gay, Herb. in Herb. Kew.*

β. montana, *Arrand.* (*sp.*) *in Bull. Soc. Polym. du Morbihan* (1863).

Folia angustiora. Semina minora, aliter insculpta.

The Icelandic specimens collected by Mr. Backhouse in 1885 are more stunted, and the base of the stems more woody: they differ in this respect from Mr. Babington's more typical specimens collected in 1846.

Geogr. limits.—*N.* and *E.* Kola Peninsula, in Lapland (*ex Nym. Consp. Fl. Eur., suppl.*, ii. p. 51).
S. Morocco.
W. Iceland; along the coast.

24. S. glareosa, *Jord., Pugill. Pl. Nov. in Mém. Acad. Nat. Lyon* (1851), p. 242; *Willk., Ic. Descr. Pl. Rar. Hisp.*, i. p. 38, t. 22; *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 668 (S. inflata *var.* glareosa).

Caules cæspitosi laxe adscendentes pumili glabri superne ramosi tortuosi. Folia glaucescentia basi attenuata, radicalia oblonga fere spathulata tamen acuta, superiora ramealia anguste lanceolata; bracteæ scariosæ. Cymæ dichotomæ ramis

inæqualibus paucifloris. Calyx ovato-ellipticus umbilicatus, dentibus late triangularibus obtusiusculis. Petala alba bifida, appendicibus bilobis. Capsula ovato-globosa carpophorum ter superans. Semina rotundata tuberculatomuricata, dorso convexa, faciebus plana.

A *S. inflatâ* differt præsertim inflorescentiâ seriore, calyce minus inflato, petalis coronatis, caulibus humilioribus magis diffusis, foliis angustioribus glaucescentibus.

Geogr. limits.—*N.* and *E.* Depart. of Rhône; near Lyons.
S. Cadaques, in prov. Catalonia.
W. Bielsa, in prov. Aragon.

25. SILENE INFLATA, *Smith, Fl. Brit.*, p. 467 (1800); *Syme, Engl. Botany*, ed. III. ii. p. 56, t. 199; *Rohrb., Monogr.*, p. 84 (S. Cucubalus).

Adde syn. S. amœna, *Huds., Fl. Anglica*, ed. I. p. 164; S. crispata, *Stev.*; S. Cserei, *Schur* (non *Baumg.*); S. Antelopum, *Steud., Nom. Bot.*, ed. II. i. p. 450; S. sersuensis, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 209; S. vulgaris, *Garcke, Fl. Nord. Mitt. Deutschl.*, ed. IX. p. 64 (1869).

β. CILIATA, *Lange, in Kjoeb. Vidensk. Meddel.*, 1865 (1866), p. 111 (*Pugill. Pl.*, p. 306); *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 668.

Folia utrinque puberula, margine aspero-ciliata, inferiora elliptico-ovata. Petala rosea, calyce parum longiora.

Syn. S. puberula, *Jord. in Bor. Fl. Cent. France*, ed. III. ii. p. 94.

γ. ALPINA, *Rohrb., Monogr.*, p. 87; S. alpina, *Thomas, Cat.* (1837), p. 45; *Willk., Ic. Descr. Pl. Rar. Hisp.*, i. p. 38, t. 23.

Adde syn. S. brachyantha, *Schur* (non *Schott*).

Ex syn. *S. glareosa*, est species propria.

To substitute for this old-established name of the plant that of *S. Cucubalus* is not only indefensible, but inaccurate. Rohrbach, in his monograph, selected Wibel's name for the species, but as the specific name is that of a neighbouring genus, it is hardly admissible, as well as pedantic; even if it were otherwise suitable, a still older name (by three years) is "Cucubalus inflatus, *Salisb.*" ('Prodr. Stirp.,' p. 302), published in 1796, which name Smith retained in transferring the species to *Silene*. With respect to Rohrbach's change of name, the following note by the late Mr. Ball ('Journ. Linn. Soc.,' xvi. 1877, p. 356), is much to the point:—"Nomen triviale ab omnibus fere botanicis receptum cl. Rohrbach infauste mutavit. Si solo antiquitatis jure legamur, *Silene vulgaris* erit. Nomen 'Behen vulgaris' (in *Moench, Method.*), est enim Wibeliano pluribus annis

antiquins." Where a correct and suitable name has thus been in general circulation for nearly 70 years, nothing is to be gained by substituting for it an obscure and unsuitable name which happens to occur in an almost forgotten flora published less than a year before. The citation as given in Rohrbach's synonymy of the species is erroneous, being the page of the 'English Flora' (1824), instead of the correct one of the 'Flora Britannica' (1800).

Geogr. limits.—*N.* and *E.* Siberia.
S. Hindostan.
W. Ireland; county of Kerry (*Moore*, Cybele Hibernica).

26. Silene commutata, *Guss.*, *Fl. Siculæ Prodr.*, i. p. 499 (1827), *et Fl. Siculæ Syn.*, i. p. 485; *Cusin et Ansb.*, *Herb. Fl. Franç.*, iv. (1869), t. 554; *Rohrb.*, *Monogr.*, p. 86 (S. Cucubalus *var.* commutata).

Caules ascendentes, simplices vel e basi ramosi, robusti, glabri. Folia glauca glabra, inferiora ovata interdum ciliata, intermedia subcordato-ovata, superiora elliptica vel ovato-lanceolata, omnia longe mucronata margine cartilaginea: bracteæ herbaceæ foliis conformes minores, prophylla scariosa. Flores, etiam alares, longe pedicellati, sub anthesi nutantes, in cymam corymbosam dispositi. Calyx ovoideus umbilicatus, dentibus ovato-triangularibus obtusis. Petala alba, unguibus superne dilatatis subexsertis, laminâ obovatâ bilobâ, lobis oblongo-linearibus, coronâ ad duo tubercula reductâ. Capsula ovoideo-globosa carpophorum ter superans. Semina granulata dorso faciebusque plano-subconvexa.

A *S. inflatâ* differt foliis latioribus basi sæpe cordatis, calyc minus globoso, seminibus granulatis.

β. longifolia, *Willk. et Lange*, *Prodr. Fl. Hisp.*, iii. (1878) p. 669.

Folia omnia basi attenuata lanceolato-linearia longe acutata, superiora e basi rotundata longe acuminata. Flores magni.

Geogr. limits.—*N.* Corsica (*Pouzolz*, *ex Gren. et Godr.*, *Fl.* France, i. p. 202).
S. Cyprus (*Kotschy*, *ex Boiss.*, *Fl. Orient.*, i. p. 629).
E. Near Elizabethpol, in Trans-Caucasia (*Hohenacker*, *ex Ledeb.*, *Fl. Rossica*, i. p. 305).
W. Gibraltar (*Willk. et Lange*, *Prodr. Fl. Hisp.*, iii. p. 669).

27. SILENE CSEREI, *Baumg., Enum. Transsilv.*, p. 345 (1816); *Lindm. in Act. Hort. Bergian.*, i. (1891) n. 6. p. 14, f. 34) (*sphalmate*, "S. Fabaria").

Caules flexuosi glabri. Folia cordato-lanceolata in apicem attenuata, mucronulata, glabra, carnosula; bracteæ et prophylla lanceolatæ albo-membranaceæ. Cyma semel dichotoma, ramis longissimis flexuosis ob ramulum alterum dichotomiæ in vicem abbreviatum racemoso-cymuliferis; flores subnutantes calyce longius pedicellati. Calyx anguste campanulatus in petiolum attenuatus glaucescens, dentibus triangulari-ovatis obtusis albo-marginatis apice lanuginosis, fructifer e basi breviter turbinatâ ampliato-ovatus apice leviter contractus. Petala alba bipartita ecoronata, lobis lineari-cuneatis emarginatis. Capsula ovata carpophorum 5–6-plo superans. Semina seriatim tuberculata, dorso plano-convexa, faciebus subconcava.

This species was wrongly sunk in *S. Fabaria* by Rohrbach; among other differential characters the calyx has 20 nerves (not 10), as pointed out by Lindman.

Hab. Transylvania; and Mt. Sulucu, in Dobrudscha, *Janka* (1876).

2. Petala, unguibus non auriculatis, fimbriato-multifida.

28. S. PHYSALODES, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 83; *Rohrb., Monogr.*, p. 88.

Inflorescentiâ, petalis minutis, pedicellis refractis, a *S. fimbriatâ* distincta.

Hab. Near Cæsarea Philippi (Banias), in N. Palestine.

29. S. FIMBRIATA, *Sims, Bot. Mag.*, t. 908 (1806); *Rohrb., Monogr.*, p. 88 (S. multifida).

Syn. Lychnis Behen, *etc.*, *Buxb., Pl. Cent.*, iii. p. 31, t. 57 (1735).

Cucubalus fimbriatus, *Gueldenst. Reise*, ii. p. 24 (1791); C. multifidus, *Adams*, in Herb. Banks; C. multifidus, *Weber et Mohr, Beitr.*, i. p. 57 (1805); C. fimbriatus, *Bieb., Fl. Taur.-Cauc.*, i. p. 333 (1808).

Viscago fimbriata, *Hornem. Hort. Hafn.*, i. p. 409 (1813).

It is not worth while to change Sims's name, since all the literature connected with the plant is under this name; it has been long in circulation, and by this name it is known in most of the floras, so that the adoption of the name proposed by Rohrbach would only cause confusion in a genus

in which the synonymy is already sufficiently involved. In *S. lacera*, which is given as a variety of this species, the ovary is not trilocular at the base, so that it must be transferred to *Melandryum*, and appears to be near *Melandryum Elizabethæ*.

Hab. In the mountains of Lazistan, Russian Armenia, and the Caucasus.

30. SILENE CAMPANULATA, *S. Wats. in Proc. Amer. Acad.*, x. (1875) p. 341; *B.L. Robinson, l.c.*, xxviii. (1893) p. 137.

Caulis erectus, simplex vel apice dichotome ramosus, glanduloso-pubescens. Folia ovata vel lanceolata. Flores solitarii vel pauci, nutantes, breviter pedicellati. Calyx viridis, campanulatus, profunde dentatus, superne reticulato-venosus, dentibus late ovatis, obtusiusculis. Petala angusta 4-partita, lobis ad medium bifidis seu lateralibus integris vel emarginatis, appendicibus oblongis carnosis integris. Filamenta villosa exserta. Capsula suborbicularis, breviter stipitata.

a. LATIFOLIA. Folia ovata acuta. Petala albo-viridula.

Syn. S. campanulata *var.* Greenei, *S. Wats. herb. ap. B. L Robinson, l.c.*

Hab. Cañonville, in Oregon, and Yreka, in California.

β. ANGUSTIFOLIA. Planta leviter glanduloso-pubescens. Foli lanceolata acuminata. Petala carnea.

Hab. Mendocino County and Humboldt County, in Nort California.

According to Robinson the broad-leaved is the commoner form, so tha this is here considered as the type of the species.

Subgenus II. CONOSILENE.

Calyx 20–30-vel 60-nervius, nervis haud anastomosantibus fructifer e basi ampliatâ, apicem versus attenuatus. Flore in dichasio simplici vel composito, sæpe ramo altero abbreviat et alterius in axillâ ramo accessorio evoluto, rarius flor solitarii. Herbæ annuæ.

a. Calyx 20-nervius.

31. S. AMMOPHILA, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. viii. p. 82; *Boiss., Fl. Orient., suppl.*, p. 90; *Rohrb., Monog* p. 89.

Hab. The islands of Crete and Gaidaronisos.

32. SILENE CONIFLORA, *Nees, ex DC. Prodr.*, i. p. 371; *Rohrb., Monogr.*, p. 89.

β. PURPUREA, *Fenzl.* Caulis a medio ramosus, scabro-pubescens. Calyx dentibus lineari-lanceolatis acuminatis. Petala purpurea.

Syn. S. molopica *var.* purpurea, *Fenzl*, in Herb. Kew.

Hab. Near Aleppo.

Geogr. limits.—*N.* Kisil-Arwat, in Russian Turkestan (1884).
E. Ssertschah, in Persia.
S. Ruins of Persepolis, in Persia.
W. Tafilah, in Palestine.

b. Calyx 30-nervius.

a. Capsula carpophoro brevi stipitata.

33. S. SUBCONICA, *Friw. in Flora*, xviii. (1835) p. 334; *Rohrb., Monogr.*, p. 90.

Adde: Filamenta basi villosa.

Differt a *S. juvenali* calyce angustiori et longiori, petalorum unguibus exsertis, capsulâ stipite longiori suffultâ.

There is no necessity for citing *S. conica*, Hampe, (non Linn.) as a synonym, as the context is sufficiently clear.

Geogr. limits.—*N.* and *W.* Servia (ex *Nym., Consp. Fl. Europ.*).
E. Philippopolis, in E. Rumelia.
S. Mekri, in Greece.

34. S. JUVENALIS, *Delile, Ind. Sem. Hort. Monsp.* (1836) p. 28; *Rohrb., Monogr.*, p. 90.

Planta *S. conicâ* sæpius major, cymis laxioribus, floribus longius pedicellatis, calyce breviori latiori, laminâ amplâ, capsulâ breviori stipitatâ.

So called from Port Juvenal, near Montpellier, where it was first discovered, having been accidentally introduced from the East, but has not been met with since.

Geogr. limits.—*N.* Boli, in Anatolia.
E. Kara-Khoï, in prov. Siwas.
S. Elmalu, in Anatolia.
W. Near Volo, in Thessaly, at the base of Mt. Pelion (*Heldreich* (1883), *ex Nym., Consp. Fl. Eur., suppl.*, ii. p. 56).

β. Capsula sessilis.

† Filamenta pubescentia.

35. Silene lydia, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I, i. p. 37; *Rohrb.*, *Monogr.*, p. 91.

Affinis *S. juvenali*, quæ tamen calyce breviore umbilicato, capsulâ stipitatâ seminumque formâ diversa est.

Geogr. limits.—*W.* Near Smyrna, in Anatolia.
E. Arjish-Dagh (Mt. Argæus), in prov. Karamania.

36. S. Sartorii, *Boiss. et Heldr.*, *Diagn. Pl. Nov. Or.*, Ser. II v. p. 53; *Rohrb.*, *Monogr.*, p. 91.

Differt a *S. conicâ* caulibus prostatis, foliis obtusis pinguibus calycibus subumbilicatis ejusque dentibus brevioribus, seminibus levibus.

Geogr. limits.—*N.* and *W.* Rhaphti, near Athens (*Heldreich ex Nym.*, *Consp. Fl. Eur.*, *suppl.*, ii. p. 56).
S. and *E.* Islands of Milo and Mykoni, in the Greek Archipelago.

37. S. conica, *Linn.*, *Sp. Plant.*, ed. I. p. 418; *Syme*, *Engl. Bot.*, ed. III. ii. p. 58, t. 20[illegible]; *Rohrb.*, *Monogr.*, p. 91.

Inflorescentia breviter corymbosa vel abortu alterius ex axibus secundariis unilateraliter spicata, vel uniflora.

Geogr. limits.—*N.* and *E.* Between Tobolsk and Tomsk, in Siberia, 58°.
S. Algeria.
W. Spain; prov. of Old Castile.

†† Filamenta glabra.

38. S. conoidea, *Linn.*, *Sp. Plant.*, ed. I. p. 418; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5062*; *Rohrb.*, *Monogr.*, p. 92.

Forma obcordata; *Rohrb.*, *Monogr.*, p. 92; lamina major obcordata.

Syn. S. conoidea *var.* obcordata, *Boiss.*, *Fl. Orient.*, i. p. 580.

β. glabrescens, *Boiss.*, *Fl. Orient.*, i. p. 580; *Rohrb.*, *Monogr.* p. 92. Glabra; rostrum capsulæ abbreviatum.

Rohrbach says that the species is not found in Italy, but it is include

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[*] The names of "*conoidea*" and "*conica*" have been inadvertentl transposed on the plates.

by Tanfani in Parlatore's 'Fl. Italiana,' and it is also found about Nice, in the adjoining French department of Alpes-Maritimes.

Geogr. limits.—*E.* Tsaidam Mts., in prov. of Tangut, long. 96° (Maximowicz).
W. Andalusia, in Spain.
N. Montélimar, in the department of Drôme, 45°. (*Villars, ex Gren. and Godr., Fl. de France*, i. p. 205.)
S. Mt. Sinai, 28°.

39. **Silene multinervia**, *S. Wats. in Proc. Amer. Acad.*, xxv. (1890) p. 126; *B. L. Robinson, l.c.*, xxviii. (1893) p. 131.

Caulis parce ramosus, erectus, glanduloso-pubescens. Folia inferiora oblanceolata, obtusa, superiora lineari-oblonga vel linearia acuta; bracteæ lineares acutæ. Calyx anguste ovatus, dentibus acuminatis purpureo-marginatis. Petala purpurascentia emarginata. Capsula oblongo-ovata inclusa. Semina minuta tuberculata.

Californian botanists are inclined to regard this as an introduced plant, and Davidson (in *Erythea*, i. p. 58), reduces it to *S. conoidea*, a species which differs in its larger flowers, acute radical leaves, and globular rostrated capsule.

Hab. California.

40. **S. amphorina**, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 330.

Caulis ramosus adscendens, tenuis, brevissime hirtello-puberulus. Folia parva, inferiora spathulata, superiora linearia, plus minus ciliata basi lanata; bracteæ valde inæquales, lineares. Calyx florifer turbinatus, fructifer e basi ampliatâ ovato-conicus, umbilicatus, dentibus herbaceis triangularibus barbulato-ciliatis. Petala purpurea bipartita, unguibus exsertis glabris, appendicibus bifidis acutis. Capsula globosa longe rostrata glabrescens carpophoro sublongior. Semina badia, compressa, dorso profunde canaliculata, faciebus planiuscula alis duabus undulatis marginatis.

Hab. Algeria; Oued Cherilla, base of the Filfila.

c. Calyx 60-nervius.

41. **S. macrodonta**, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 37; *Rohrb., Monogr.*, p. 92.

β. **pamphylica**, *Boiss., Fl. Orient.*, i. p. 581; *Boiss. et Heldr.* (sp.), *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 82. Lamina amplior magis exserta: capsula ovata.

Species inflorescentiæ ramulis stricte cymosis, axibus secundariis plus minus elongatis, capsulâ eâ *S. conicæ* longiori angustiorique.

Geogr. limits.—*N.* Modurlu, in Anatolia.
S. Cyprus.
E. Prov. Aleppo.
W. Elmalu, in Anatolia.

Subgenus III. EUSILENE.

Calyx semper 10-nervius, vel evenius vel nervis anastomosantibus, nunquam vesicarie inflatus, fructifer autem supra carpophorum sæpe a capsulâ maturescente distentus. Inflorescentia valde varians. Species annuæ, biennes, vel perennes.

Sectio I. CINCINNOSILENE.

Flores in cincinnis plus minus laxis (racemis secundis scorpioideis) simplicibus vel geminatis, breviter vel raro longe pedicellati vel subsessiles, interdum primo dichasium simplex vel duplex formantes, dichasii deinde ramis scorpioideis. Herbæ annuæ vel biennes, paucæ perennes.

A. Species annuæ vel biennes.

a. APTEROSPERMÆ.

Semina reniformia vel globosa, dorso nunquam alis undulatis marginato.

Series 1. *Dichotomæ.*

Flores in cincinnis geminatis brevissime pedicellati vel subsessiles, primo in dichasio simplici vel duplici, ramis dichasii lateralibus scorpioideis. Calyx evenius, fructifer apice contractus. Herbæ interdum biennes.

a. Semina faciebus plana.

42. SILENE LAGENOCALYX, *Fenzl, in Kotschy, Pl. Pers. Austr.* (1845); *Boiss., Fl. Orient.*, i. p. 587; *Rohrb., Monogr.*, p. 93.

Forma PURPUREA.

Syn. S. lagenocalyx *var.* purpurea, *Boiss., Fl. Orient.*, i. p. 588.
Hab. S. Persia.

43. S. GRÆCA, *Boiss. et Sprun., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 36; *Rohrb., Monogr.* p. 93.

Facies *S. Behen* a quâ differt inflorescentiâ, calyce haud venoso-reticulato, capsulâ angustiore calycem distendente, petalisque.

Geogr. limits.—*N.* Epirus, in Turkey, *Chodzes* (1879).
S. and *E.* Nome of Messenia, in Greece.
W. Ionian Isles; Cephalonia.

44. SILENE DICHOTOMA, *Ehrh.*, *Beitr.*, vii. p. 144; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5071; *Rohrb.*, *Monogr.*, p. 94.

β. IBERICA, *Bieb.*, *Fl. Taur. Cauc.*, i. p. 335 (sp.); *Rohrb.*, *Monogr.*, p. 94. Calyx glabrescens.

Adde syn. S. nocturna, *Pall.*, *Tabl. Taur.*, p. 50.

Some specimens found in 1880 near Deventer, in Holland, beyond the geographical limits, were probably introduced.

Geogr. limits.—*N.* Moravia, in Austria.
W. Montpellier, in S. France.
S. and *E.* Prov. of Talysch, in Trans-Caucasia.

45. S. RACEMOSA, *Otth, in DC. Prodr.*, i. p. 384; *Sibth.*, *Fl. Græca*, v. t. 414 (S. divaricata); *Rohrb.*, *Monogr.*, p. 95 (S. dichotoma *var.* racemosa).

Caulis pluries et divaricatim dichotomus, pilis crispis canescens. Folia oblongo-lanceolata, acuta, in petiolum barbato-villosum attenuata; bracteæ membranaceæ. Inflorescentiæ rami divaricato-ramosi. Calyx breviter cylindricus, fructifer ovato-oblongus, nervis viridibus, dentibus ovato-lanceolatis, acutis, membranaceo-marginatis, setosis. Petala alba, rarius purpurea, bipartita, lobis obovatis, appendicibus minimis obtusis. Capsula ovata carpophorum glabrum ter quaterve superans. Semina rugoso-tuberculata, dorso subcanaliculata, faciebus plana.

Syn. S. Thirkeana, *C. Koch, in Linnæa*, xix. (1847) p. 56.

β. BIGIBBOSA, *mihi.* Corona minima, appendicibus ad duas squamulas vel gibbos reductis.

Syn. S. dichotoma, *Sibth.*, *Fl. Græca*, v. p. 10, t. 413; S. sessiliflora, *Poir.*, *Encyc. Suppl.*, v. p. 154, et Herb.; S. Sibthorpiana, *Reichb.*, *Fl. Germ. Exc.*, p. 815 (in nota); S. racemosa *var.* Sibthorpiana, *Boiss.*, *Fl. Orient.*, i. p. 589.

Species a *S. dichotomâ* racemis longis laxis divaricatis, calyce 8–10 mm. tantum longo, petalis profundius bipartitis, capsulâ ovatâ, differre videtur.

γ. CAUCASICA, *mihi.* Rami graciles. Pedunculi florum longiores. Calyx brevior. Styli longe exserti. Forma minus canescens. (*Radde*, exsicc. (1893), n. 674).

Syn. S. dichotoma *var.* gracilis, *Alboff*, *Enum. Pl. Transcauc. Occid.*, p. 32 (1895).

Hab. Circassia.

δ. EUXINA, *Rupr.*, *Fl. Caucasi*, p. 184; *Boiss.*, *Fl. Orient.*, *suppl.*, p. 92.

Planta biennis. Caules numerosi, laterales decumbentes.
Folia basilaria lanceolato-spathulata. Semina minora.

Geogr. limits.—*N.* Between Poti and Batoum, in Trans-Caucasia (*var.* euxina).
S. Palestine.
E. Persia; between Teheran and Tabreez.
W. Slivno, in E. Rumelia (*Skorpil*, *ex Nym.*, *Consp. Fl. Eur.*, *suppl.* ii. p. 54).

b. Semina faciebus curvato-excavata.

46. SILENE VESPERTINA, *Retz.*, *Obs. Bot.*, ii. p. 31; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 44, t. 29A; *Rohrb.*, *Monogr.*, p. 95.

From Retzius's description this plant is certainly identical with *S. hirsuta*, Poir., and *S. hispida*, Desf. By authors it is often confused with *S. sericea*, which, however, differs from it in habit and in the remarkable form of the seeds. It is also near *S. hirsuta*, Lag. (= *S. laxiflora*, Brot.), which latter is distinguished by cincinni simple never geminate, fructiferous calyx not contracted above with ovate obtuse teeth, and claws of the petals exserted.

Geogr. limits.—*N.* Near Trieste, in Istria.
S. N. Algeria.
E. Crete.
W. Portugal (ex *Nym.*, *Consp. Fl. Eur.*, p. 96).

47. S. DISTICHA, *Willd.*, *Enum. Hort. Berol.*, p. 476, et herb., n. 8660; *Schrank*, *Pl. Rar.*, t. 39 (micropetala); *Rohrb.*, *Monogr.*, p. 96.

Adde syn. S. hirsuta, *Schousb. ex Ball*, *in Journ. Linn. Soc.* (*Bot.*), xvi. (1877) p. 356.
S. pilosa, *Willd.*, *Enum. Hort. Berol.*, p. 476 (in herb. abest).

Geogr. limits.—*N.* and *E.* Minorca, in the Balearic Isles.
S. Algeria.
W. Portugal (*Daveau*, *Magn. Fl. Sel.*, exs. n. 1382).

Series 2. *Scorpioideæ.*

Flores in cincinnis simplicibus; interdum infra florem axis primariæ terminalem unilateraliter ramus scorpioidens evolutus, ita ut stirps dichotoma esse videatur, dichotomia autem nunquam florigera.

A. Semina reniformia faciebus curvato-excavata, dorso (*exc. S. gallica et S. Giraldii*) obtuse canaliculata.

a. Calyx fructifer apice contractus.

α. Filamenta basi villosa; calyx evenius.

48. SILENE GALLICA, *Linn.*, *Sp. Plant.*, ed. I. p. 417; *Rohrb.*, *Monogr.*, p. 96.

Species per totam fere orbem terrarum aufuga ob formas pro diverso climate et substratu habitu sæpe valde distantes difficillime describenda. In Europâ mediâ et australi indigena, ad totius fere orbis terrarum littora translata et quasi spontanea.

(1) Forma genuina, calyx florifer pilis adpressis, fructifer erectis vel patentibus.

— S. gallica, *Linn.*, *Sp. Plant.*, ed. I. p. 417; *All. Fl. Pedem.* iii. t. 79, fig. 3.

(2) Forma pilosior, calyx fructifer pilis horizontaliter patentibus.

— S. lusitanica, *Linn.*, *Sp. Plant.*, ed. I. p. 416; *Dill. Hort. Eltham.*, p. 420, t. 311, fig. 401.

(3) Forma ramosior minus pilosa, calyx fructifer pilis reflexis.

— S. anglica, *Linn.*, *Sp. Plant.*, ed. I. p. 416; *Syme*, *Eng. Bot.*, ed. III. ii. p. 60, t. 202.

(4) Forma floribus ad ramosum apicem in glomerulos scorpioideos 5–10-floros aggregatis.

— S. pygmæa, *Link*, *in Hort. Erfurt.* (1838); ex *Rohrb.*, *l.c.*, 98.

(5) Forma cincinnis duplicibus.

— S. Haenkeana, *Presl*, *in Rel. Haenk.*, ii. p. 19 (sp. ??).

(6) Forma, petalorum macula puniceo-sanguinea limbo albido.

— S. quinquevulnera, *Linn.*, *Sp. Plant.*, ed. I. p. 416; *Syme*, *Engl. Bot.*, ed. III. ii. p. 60, t. 203.

Geogr. limits.—*N.* Germany.
W. Portugal.
S. The Lesser Oasis (El Bahariyeh), in Lower Egypt (*Ascherson, in Mém. Inst. Egypt.*, ii. (1889) p. 46).
E. Western Caucasus (*Nordmann, ex Ledeb., Fl. Rossica*, i. (1842) p. 315).

β. Filamenta glabra.

† Calyx evenius.

49. SILENE GIRALDII, *Guss., Pl. Inarim.*, p. 36, t. 1 (1855); *Rohrb., Monogr.*, p. 98.

Hab. District of Naples; and Magdalena Archipelago, between Corsica and Sardinia (*Vaccari*, in Malpighia, 1894, p. 233).

† † Calyx striis anastomosantibus.

50. S. CERASTIOIDES, *Linn., Sp. Plant.*, ed. I. p. 117; *Sibth., Fl. Græca*, v. p. 9, t. 412; *Rohrb., Monogr.*, p. 98.

Auctoribus cum *S. gallicâ* confusa, differt autem calycis striis anastomosantibus, filamentis glabris, capsulâ rostratâ.

Syn. S. tridentata, *Boiss., Fl. Orient., suppl.*, p. 93 (nec *Desf.*).
Ex *syn.* S. articulata = S. gallica.

Geogr. limits.—*N.* The Alps of Carinthia.
E. Anatolia.
W. Near Madrid.
S. Egypt, on the coast (*Asch. et Schweinf. in Mém. Inst. Egypt.* ii. (1889) p. 46).

51. S. CALYCINA, *Salz., It. Hisp. Tingit.*; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 51, t. 36 (S. tridentata); *Rohrb., Monogr.*, p. 99 (S. tridentata).

Species priori valde affinis differt habitu majore, floribus majoribus subsessilibus nec pedicellatis, calycis sub anthesi latioris dentibus longioribus, petalis inclusis et capsulæ forma. Petala nunquam tridentata.

Syn. S. coarctata, *Lag.* (vide *Willk., Prodr. Fl. Hisp., suppl.*, p. 279 [1893]).

In this plant the petals are invariably bifid: for this reason Salzmann's later name has been substituted for Desfontaines's erroneous and inaccurate name of "S. tridentata."

Geogr. limits.—*S.* and *W.* Canary Isles.
N. and *E.* Near Lerida, in prov. of Catalonia, Spain (*Gonzales, ex Willk. et Lge., Prodr. Fl. Hisp.*, iii, p. 648).

b. Calyx fructifer apice non contractus.

α. Filamenta basi villosa.

52. SILENE REFLEXA, *Aiton, Hort. Kew.* ed. II. iii. p. 86, (1813); *Tenore, Fl. Napolitana*, t. 230 (S. neglecta); *Rohrb., Monogr.*, p. 99.

Valde affinis *S. nocturnæ*, a quâ calyce evenio ejusque dentibus linearibus herbaceis, petalis emarginatis, filamentis basi villosis, capsulâ ovato-oblongâ, differt.

Geogr. limits.—*N.* Fréjus, in the depart. of Var, France.
S. and *W.* Algeria.
E. Calabria.

β. Filamenta glabra.

† Capsula oblonga subsessilis.

53. S. NOCTURNA, *Linn., Sp. Plant.*, ed. I. p. 416; *Reichb., Ic. Fl. Germ. Helv.*, n. 5059; *Rohrb., Monogr.*, p. 100.

Syn. S. Boullui, *Jord. ex Mars., Cat. Pl. Cors.*, p. 28.
S. gallica (non *Linn.*), *Groves, Fl. Terr. Otrant., in Nuovo Giorn. Bot. Ital.*, xix. (1887) p. 130.
S. apetala (non *Willd.*), *Groves, l.c.*
S. decipiens, *Ball, in Journ. Bot.* xi. (1873) p. 301.

β. LASIOCALYX, *Soy-Will., Sil. Alg.*, p. 20; *Rohrb., Monogr.*, p. 101.

Varietas calyce lanuginoso.

γ. ROSEA, *Haussk. in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 52.

Folia inferiora et intermedia spathulata mucronulata. Inflorescentia laxior. Petala rosea.

Hab. Eleusis in the nome of Attica, and near Corinth.

Geogr. limits.—*N.* Liguria, in Italy.
E. Palestine.
S. and *W.* Canary Isles.

54. S. BRACHYPETALA, *Rob. et Cast. in DC., Fl. Franç.*, v. p. 607 (1815); *Reichb., Ic. Fl. Germ. Helv.*, n. 5058; *Rohrb., Monogr.*, p. 101 (S. nocturna *var.* brachypetala).

Syn. S. nocturna *var.* brachypetala, *Benth.*, *Cat. Pl. Pyren.*, p. 122 (1826).
S. apetala (non *Willd.*), *Groves*, *Contrib. Fl. Terr. Otrant.*, *in Nuovo Giorn. Bot. Ital.*, ix. (1877) p. 54.

Caulis erectus, simplex vel e basi alternatim ramosus, scabride puberulus superne viscidulus. Folia spathulato-lanceolata lanceolatave, pubescentia, inferiora basi sæpe longe ciliata; bracteæ ovatæ herbaceæ ciliatæ inæquales. Flores plus minus distantes. Calyx tubulosus, fructifer oblongus, pilis brevibus ad nervos virides superne anastomosantes paullum longioribus, scabridus, dentibus lanceolatis acutis margine scariosis ciliatis; petala alba subtus viridia raro purpurea albo-marginata cuneata emarginata ecoronata subinclusa. Capsula cylindrica carpophorum puberulum sexies superans. Semina dorso margine tuberculata.

β. PERMIXTA, *Jord.* (sp.) *Pugill. Plant. Nov.*, *in Mém. Acad. Lyon*, (1851) p. 243; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 69, t. 50 A (S. nocturna *var.* micrantha); *Rohrb.*, *Monogr.*, p. 101.

Geogr. limits.—*N.* Narbonne, in the depart. of Aude.
S. Algeria.
E. Pompeiopolis, in Cilicia.
W. Teneriffe.

†† Capsula carpophorum bis terve superans, vel fere æquans.

55. SILENE REMOTIFLORA, *Vis.*, *Fl. Dalmatica*, iii. p. 166, t. 53 (1852); *Rohrb.*, *Monogr.*, p. 101.

Hab. Near Gelsa, in Dalmatia.

56. S. OBTUSIFOLIA, *Willd.*, *Enum. Hort. Berol.*, p. 473, et Herb., n. 8629; *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 125, t. 79; *Rohrb.*, *Monogr.*, p. 102.

Adde syn. S. mauritanica, *Pomel*, *Nouv. Mat. Fl. Atlant.*, p. 328 (1874).

Geogr. limits.—*N.* Near Faro, in prov. Algarve, Portugal.
S. and *W.* Canary Isles.
E. Lower Egypt.

57. S. HIRSUTA, *Lag.*, *Varied. de Cienc.* (1805) p. 212; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 43, t. 29; *Rohrb.*, *Monogr.*, p. 102.

Adde syn. S. hispida, *Salzm. ex Ball*, *in Journ. Linn. Soc.* (*Bot.*), xvi. (1877) p. 358.

Geogr. limits.—Spain and Portugal.

58. SILENE POMPEIOPOLITANA, *J. Gay*, *ex Boiss.*, *Fl. Orient.*, i. p. 595; *Rohrb.*, *Monogr.*, p. 103.

Hab. Ruins of Pompeiopolis, on the coast of Cilicia, near Mersina.

59. S. MOGADORENSIS, *Coss. et Bal. in Bal.*, *Pl. Marocc. Exsicc.* (1867), *ap. Coss. in Bull. Soc. Bot. Fr.*, xxii. (1875) p. 55; *et Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 126, tt. 80, 81.

Caules 20–60-centim. longi, solitarii v. plures, sæpius a basi vel infra medium ramosi, erecti vel laterales adscendentes, pubescenti-glandulosi. Folia inferiora obovato-oblonga, obtusa, in petiolum attenuata, pilis brevissimis quasi punctata, margine ciliata, ciliis inferioribus sæpius elongatis, media et superiora sæpius longius supescentia et ciliata oblongo-lanceolata vel lanceolata acuta, in var. *β oblonga* vel obvato-oblonga obtusa. Bracteæ inferiores conformes, superiores valde inæquales lineari-lanceolatæ vel lineares cum pedicellis et calycibus plus minus pubescenti-glandulosæ. Flores erecti vel suberecti, inferioribus sæpius longe superioribus brevius vel brevissime pedicellatis, in pseudoracemos terminales geminatos, rarius solitarios, simplices vel bifidos, subsecundos, laxos 4–9-floros dispositi. Calyx tubuloso-infundibuliformis truncato-umbilicatus, fructifer infra capsulam constrictus, pubescenti-glandulosus, membranaceus, nervis virentibus vel rubescentibus, superne vix anastomosantibus, dentibus ovatis obtusiusculis membranaceo-marginatis ciliatis. Petala purpurascentia bipartita, lobis oblongis, appendicibus binis ovato-oblongis subintegris vel erosulis. Capsula cylindraceo-oblonga carpophorum glabrum fere bis superans.

α. GENUINA. Planta dense pubescenti-glandulosa pube pilis numerosis elongatis permixtâ. Folia caulina oblongo-lanceolata vel lanceolata apice sensim acutata.

Syn. S. canariensis, *Otth, in DC. Prodr.*, i. p. 372.
S. corrugata, *Ball, in Journ. Bot.*, xi. (1873) p. 301, *et Spicil. Fl. Marocc. in Journ. Linn. Soc. (Bot.)*, xvi. (1877) p. 359.
S. adusta, *Ball, in Journ. Linn. Soc. (Bot.)*, xvi. (1877) p. 360.

β. OBTUSIFOLIA, *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 127, t. 81. Planta parcius pubescenti-glandulosa pilis minus inæqualibus. Folia caulina oblonga vel obovato-oblonga obtusa.

γ. MACROSPERMA, *Coss, Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 127. Planta sparse pubescenti-glandulosa pilis parum inæqualibus. Folia caulina obtusa. Calyx amplior, fructifer superne oblongo-subclavatus. Semina maxima dorso evidentius canaliculata.

Hab. Marocco.

60. SILENE PALÆSTINA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 80; *Rohrb.*, *Monogr.*, p. 103.

β. DAMASCENA, *Boiss. et Gaill.* (sp.) *Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 34; *Rohrb.*, *Monogr.*, p. 103.

In the specimens sent to Rohrbach by Boissier himself as authentic, the capsule is found sometimes to be twice the length of the carpophore (as under the name of *S. damascena*), at another time nearly equal to it, so that in this character it cannot be distinguished from *S. siderophila*, Boiss. et Gaill., and as *S. damascena* can only be considered as a variety of *S. palæstina*, *S. siderophila* is reduced to a synonym. In *Fl. Orient.*, *suppl.*, p. 94, Boissier coincides with this view of the species—"Huic speciei *S. damascenam* et *S. siderophilam* ut varietates cl. Rohrbach conjungit quod ulterioribus observationibus mihi comprobandum esse videtur."

Geogr. limits.—*N.* Mt. Lebanon (*var.* damascena).
E. Near Damascus (*var.* damascena).
S. and *W.* Gaza, on the coast of Syria.

61. S. AFFINIS, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. II. i. p. 72; *Rohrb.*, *Monogr.*, p. 104.

Differt a *S. villosâ* floribus sub anthesi breviter nec calyci æquilonge pedicellatis, calycis brevioris dentibus elongatis obtusis, petalorum lobis linearibus, capsulâ ovatâ, seminum duplo majorum formâ diversissimâ.

As Rohrbach points out, Boissier in *Fl. Orient.*, i. p. 593, misquotes himself in citing *S. affinis* as a MS. name. The reason, however, why he re-named the plant *S. arabica* was his recognition of *S. affinis*, Godr., as a good species ('Fl. Juven.,' ed. I. p. 9), which latter Rohrbach shows is in no way to be distinguished from *S. micropetala*, so that Boissier's first name is one to be restored, which Rohrbach has done.

Hab. At the base of Mt. Sinai.

B. Semina reniformia valde compressa, faciebus concaviuscula, dorso acute canaliculata.

a. Calycis striæ anastomosantes, vel superne conjunctæ.

α. Calyx fructifer apice contractus.

62. S. BREVISTIPES, *sp. nov.*

Caules 35–40 centim. simplices vel parce ramosi, centralis erectus, laterales adscendentes, pilis crispulis vestiti. Folia oblanceolato-spathulata mucronata puberula parce ciliata, basi in petiolum attenuata, apice rotundata, superiora angustiora, omnia uninervia; bracteæ lineari-lanceolatæ acutæ lanuginoso-ciliatæ. Flores breviter pedicellati. Calyx tubulosus inferne haud umbilicatus, fructifer ampliato ovoideus infra capsulam vix attenuatus, nervis viridibus superne venâ unicâ conjunctis, pilis longis confervoideis patentibus vestitis, inter nervos autem scabrido-puberulus, dentibus lanceolatis acuminatis albo-marginatis ciliatis. Petala e calyce exserta bipartita lobis lineari-oblongis. Filamenta glabra. Capsula ovata subsessilis, carpophorum glabrum multies superans.—Valde affinis *S. maroccanæ*, ab eâ primo autem dignoscenda calyce fructifero apice contracto, præterea differt foliis oblanceolato-spathulatis mucronatis, bracteis lanuginoso-ciliatis, petalorum lobis latioribus, carpophoro glabro brevissimo; a *S. setaceâ* differt jam primo aspectu, calycis nervis confervoideis, etc.

Described from specimens sent by Rev. R. P. Murray.

Hab. Near Laguna, Teneriffe, *Rev. R. P. Murray* (June, (1892).

β. Calyx fructifer apice non contractus.

Of the next species described by Rohrbach (No. 46), which is *S. ligulata*, Viv.,

Lusus 1 = S. setacea.
Lusus 2 = S. sericea *α*. pubicalycina.

63. SILENE CANOPICA, *Boiss.*, *Fl. Orient.*, i. p. 596; *Rohrb.*, *Monogr.*, p. 105 (S. biappendiculata, *Ehrenb.*); *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) t. 79 (semina).

Differt a *S. setaceâ*, foliis oblongis vel oblongo-linearibus non anguste linearibus, calycis dentibus obtusis, nervis commissuralibus superne latius venulis anastomosantibus reticulatis, petalis purpurascentibus, lobis oblongo-linearibus superne latioribus, seminibus majoribus dorso, profundius et angustius canaliculatis, canaliculo utrinque marginato, marginibus angustis planis vel subundulatis.

Rohrbach suppressed the name of *S. canopica*, misled by the erroneous supposition that the specimens from Denderah (*Monogr.*, p. 110), thus labelled and distributed by Sieber were authentic, whereas this plant of Sieber's is *S. villosa*, Forsk., a species which does not occur at or near Aboûkîr, the present name of the ancient Canopus. Ehrenberg's authentic specimens of "*S. biappendiculata*," and Delile's authentic specimens of

"*S. canopica*," which are in the Montpellier herbarium, are, according to Schweinfurth, identical plants; but the descriptions of these specimens were not published till 1867, and in each case posthumously. Delile's plant was described by Boissier (*Fl. Orient.*, i. p. 596), and Ehrenberg's plant was described by Rohrbach (*Bot. Zeit.*, xxv. (1867) p. 82); Rohrbach afterwards rejecting *S. canopica*, because he was unaware that Sieber's specimens, which were the ones that he examined, were wrongly labelled. Therefore, in view of Rohrbach's misapprehension of the identity of the species, the name taken up by Boissier is to be preferred as the name of the species, and Boissier's description should be cited as the authority, since the specimens do not seem to have been adequately distributed.

Hab. Lower Egypt; near Alexandria and Damietta.

64. SILENE KUSCHAKEWICZI, *Regel et Schmalh. in Act. Hort. Petrop.*, v. (1877) p. 246.

Caulis simplex, adscendens, geniculato-flexuosus, retrorsopuberulus. Folia obverse oblonga, acuta, integerrima, asperula, ramulorum sterilium in petiolum ima basi ciliatum attenuata. Flores initio subsessiles demum longe pedicellati. Pedunculi pedicelli calycesque pilis tenuibus albis confervoideo-crispis eglandulosis albido-villosuli. Calyx cylindrico-clavatus albido-membranaceus, nervis purpurascentibus apicem versus lateraliter anastomosantibus instructus, dentibus elliptico-lanceolatis obtusis late albo-marginatis. Petala alba bifida, unguibus paullulum exsertis, limbo obovato, lobis obovato-oblongis obtusis, appendicibus binis emarginatis.

Hab. Near Wernoje, in Turkestan.

65. S. SETACEA, *Viv.*, *Fl. Lyb.*, p. 23, t. 12 (1824); *Rohrb.*, *Monogr.*, p. 105.

Lusus 1. Caulis sæpe ramosus; calyx inter nervos glaber nervis densissime hirsutis; ungues petalorum exserti.

Adde syn. S. ligulata, *Viv.*, *Fl. Lyb.*, p. 24, t. 12; *Rohrb.*, *Monogr.*, p. 104, *et in Linnæa*, xxxvi. (1870) p. 261.

Lusus 2. Caulis humilior; flores paullum minores; calyx totus breviter pubescens; ungues petalorum inclusi.

Adde syn. S. brachystachys, *Webb*, *Fragm. Fl. Aethiop.-Aegypt*, p. 34; *Rohrb.*, *Monogr.*, p. 109, *et in Linnæa*, xxxvi. (1870) p. 261.

Geogr. limits.—*N.* Tunis.
S. Nubia.
E. Arabia Petræa.
W. Djebel Tizelmi, in S.W. Morocco.

66. SILENE MAROCCANA, *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 130, t. 83.

Caules 12–30 centim. longi, plures, graciles, simplices vel parce ramosi, centrali erecto lateralibus adscendentibus, rarius solitarii erecti. Folia linearia plana vel conduplicata rarius oblongo-lanceolata acuta, dense puberula; bracteæ lanceolatæ vel lineares, hispidæ ciliatæ. Flores erecti, breviter pedicellati, in pseudoracemos terminales simplices subsecundos 3–12-floros dispositi. Calyx tubulosus, fructifer cylindraceo-dilatatus infra capsulam constrictus, albido-membranaceus, inter nervos vix sub lente puberulus vel glabrescens, nervis longe villosis viridibus, dentibus lanceolato-triangularibus acutis albo-marginatis ciliatis. Petala alba, profunde bipartita, lobis anguste linearibus, appendicibus binis ovatis, omnibus in tubum connatis. Filamenta glabra. Capsula oblongo-cylindracea, carpophorum pilis retrorsis pubescens bis terve superans. Semina marginibus alæformibus latiusculis plus minus undulatis.

A *S. setaceâ* differt foliis sæpius minus angustis, stipite capsulâ bis terve breviore non paullo breviore, et imprimis seminum fabricâ nempe sub lente vix striatulâ dorso profunde et anguste canaliculatâ, canaliculo in fundo haud tuberculato utrinque marginato, marginibus alæformibus latiusculis plus minus undulatis.

Syn. S. getula, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 329.

Hab. Marocco, *Seignette* (1870).

b. Calyx striatus evenius.

a. Calyx fructifer apice contractus.

67. S. HELDREICHII, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 81; *Fl. Orient.*, *suppl.*, p. 92; *Rohrb.*, *Monogr.*, p. 106.

Adde: Calyx fructifer oblongus infra capsulam valde constrictus, dentibus carinatim nervosis. Capsula ovato-oblonga dentibus calycinis longe superata. Semina tuberculata.

Differt a *S. dichotomâ* jam primo aspectu caule simplici nec dichotomo, bracteis herbaceis, floribus sessilibus, calycis dentibus elongatis.

Hab. Anatolia, near Adalia; and Cilicia Trachea, on the promontory of Alaya, Cape Anamour, and Mt. Yamourdabedagh.

68. SILENE OXYODONTA, *Barbey, Herbor. au Levant*, p. 121, t. 11 (1882).

Caulis e basi ramosus, ramis adscendentibus pilis longis crispis griseo-pubescentibus. Folia inferiora oblongo-spathulata basi attenuata acuta; bractæ herbaceæ oblongo-lineares acutæ basi dilatatæ. Flores subsessiles, inferiore alari. Calyx oblongus basi truncatus, nervis latis in cristas acutas prominentibus viridibus pilis crispis longis hirsutis, dentibus rigidis lanceolatis acutis subrecurvis. Petala intense purpurea, magna obcordata, bifida, lobis obtusis, appendicibus binis minimis ovatis. Carpophorum cum ovarii ½ parte æquilongum.

S. racemosæ et præsertim *S. Heldreichii* affinis a quâ floribus inferioribus alaribus, calyce florifero oblongo nec cylindrico, nervis in cristas prominentibus percurso, differt.

Hab. In the Plain of Esdraëlon, below Nazareth.

β. Calyx fructifer apice non contractus.

69. S. SCHWEINFURTHI, *Rohrb. in Bot. Zeitung*, XXV. (1867) p. 82; *Monogr.*, p. 106.

Hab. Nubia and Abyssinia.

70. S. ARABICA, *sp. nov.*

Caulis adscendens, paullum ramosus, pubescens. Folia glaucescentia, inferiora ovato-lanceolata, acuta, intermedia lanceolato-spathulata in petiolum tenuem longe attenuata, superiora minima; bracteæ lineares acuminatæ longe ciliatæ. Calyx gracilis cylindricus, fructifer clavatus ampliatus infra capsulam constrictus, striis purpureis, dentibus lanceolatis acutis albomarginatis densissime ciliatis. Petala rosea, appendicibus ovatis. Capsula ovata, carpophorum fere bis superans.

A *S. Schweinfurthi* differt præsertim habitu laxiore glaucescenti, foliis latis longius attenuatis, calyce angusto, striis purpureis.

Syn. S. chirensis, *A. Rich. ex Barbey, Pl. Arab. Schweinf.* (1889).

This specific name was one substituted by Boissier (*Fl. Orient.* i. p. 593), for his own *S. affinis* (which he misquotes as a MS. name), when he found that Godron had also described a *S. affinis*. But, as Rohrbach points out, Godron's plant is in no way to be distinguished from *S. micropetala*, so that Boissier's first name stands, and *S. arabica* becomes a synonym and available for a new species.

Hab. Gebel Schibam, near Menacha, in Arabia Felix (*Schweinfurth*).

71. SILENE CHIRENSIS, *A. Rich., Tent. Fl. Abyss.*, i. p. 44 (1847); *Rohrb., Monogr.*, p. 106 (S. schirensis).
Hab. Abyssinia.

C. Semina reniformia, faciebus plana, dorso plus minus obtuse canaliculata.

a. Calycis evenii nervi pilis basi bulbosis vel squamulis acutis vestiti, calyx fructifer apice contractus.

72. S. TRINERVIA, *Sebast. et Mauri, Fl. Rom.*, p. 152, t. 2; *Reichb., Ic. Flor. Germ. Helv.*, n. 5069; *Rohrb., Monogr.*, p. 107.
Adde: Caulis simplex, vel interdum dichotome ramosus. Pedicelli calyce breviores pilis retrorsis pubescentes. Calyx anguste clavatus, fructifer ampliatus. Petala obcordato-cuneata. Filamenta glabra. Carpophorum puberulum (non glabrum).

Geogr. limits.—*N.* The Banat, in Hungary.
W. Near Rome.
S. Anavryti, in the nome of Messenia, Greece.
E. Island of Khio, in the Turkish Archipelago.

73. S. SCABRIDA, *Soy.-Will. et Godr., Sil. Algér.*, p. 33; *Exped. Scient. en Algérie, Bot.*, t. 81; *Rohrb., Monogr.*, p. 107.
Differt a *S. trinerviâ* floribus minoribus approximatis, calycis exumbilicati nervis squamulas, nec pilos curvatos, gerentibus, commissuris levibus, dentibus acutis, petalorum appendicibus obtuse bipartitis, capsulâ ovoideâ carpophoro glabro suffultâ.
Hab. Algeria.

74. S. OROPEDIORUM, *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 132, t. 84.
Caules 10–40 centim. longi, simplices vel parce ramosi, nonnunquam superne dichotomi, adpresse puberulo-scabridi. Folia inferne ciliata, inferiora obovata vel oblonga, in petiolum breviter attenuata, media oblongo-lanceolata obtusiuscula, superiora linearia basi et apice attenuata; bracteæ lineares, pedicellos longe superantes. Flores erecti, breviter pedicellati, in pseudoracemos 3–10-floros dispositi. Calyx oblongo-tubulosus albidus, fructifer dilatatus infra capsulam angustatus, nervis viridibus latis planis crassis, a pilis latis rigidis squamu-

læformibus adpressis obtectis, dentibus longis lineari-lanceolatis acutis albo-marginatis ciliatis. Petala alba profunde bipartita, lobis anguste linearibus, appendicibus bipartitis, lobis oblongis in tubum subcohærentibus. Filamenta glabra. Capsula ovato-oblonga superne acutata, carpophorum glabrum 3–4-plo superans. Semina tenuiter corrugata, faciebus anfractuosa; canaliculi dorsalis marginibus cerebriformi-anfractuosis.

A *S. scabridâ* differt, calycis dentibus angustioribus longioribusque, petalorum lobis linearibus, et præsertim seminum fabricâ.

Hab. Algeria.

b. Calyx glaber vel, si pubescens, pilis basi non bulbosis vestitus.

a. Calyx fructifer apice non contractus.

† Calyx nervis anastomosantibus.

75. SILENE MICROPETALA, *Lag.*, *Gen. et Sp. Pl.*, p. 15 (1816); *Soy.-Will.*, *Exp. Scient. en Algérie*, *Bot.*, t. 81 (S. vestita); *Rohrb.*, *Monogr.*, p. 108.

Geogr. limits.—*N.* Fuencarral, in prov. of New Castile, Spain.
S. and *E.* Near Oran, in Algeria.
W. Faro, in prov. of Algarve, Portugal.

76. S. CISPLATENSIS, *Cambess. in A. St. Hil. Fl. Brasil. Merid.*, ii. p. 117, t. 108; *Mart.*, *Fl. Brasil.*, xiv. pars II. p. 291, t. 66 (1872); *Rohrb.*, *Monogr.*, p. 108.

Species priori valde affinis, differt tamen pubescentiâ, calycis dentibus ovatis, petalis longe diversis.

Hab. Uruguay; near the city of Monte-Video.

77. S. IMBRICATA, *Desf.*, *Fl. Atlantica*, i. p. 349, t. 98 (1798); *Rohrb.*, *Monogr.*, p. 109.

β. POMELI, *Battand.* (sp.) *in Bull. Soc. Bot. France*, xxxviii. (1891) p. 219.

Planta hispida; calyx nervis parce anastomosantibus.

Syn. S. obtusifolia (non *Willd.*) *Pomel.*

This plant is not sufficiently distinct from *S. imbricata* to be considered a separate species.

Hab. Algeria.

†† Calyx evenius.

78. SILENE CLANDESTINA, *Jacq.*, *Collect.*, *suppl.*, p. 111 (1796) t. 3; *Rohrb.*, *Monogr.*, p. 109.

Adde syn. S. angustifolia, *D. Dietr.*, *Syn. Plant.*, ii. p. 1568 (1839–1852).

Geogr. area.—Africa.—*N.* Algeria. *S.* Cape Colony.

79. S. DISCOLOR, *Sibth. et Smith*, *Prodr. Fl. Græc.*, i. p. 292 (1806); *Fl. Græca*, v. t. 410; *Rohrb.*, *Monogr.*, p. 110.

Habitu valde accedit ad *S. pompeiopolitanam*, differt tamen pubescentiâ, floribus omnibus breviter pedicellatis, petalorum colore, seminumque formâ diversâ.

Geogr. limits.—*E.* Cyprus.
W. Island of Milo, in the Grecian Archipelago.

80. S. VILLOSA, *Forsk.*, *Fl. Aegypt. Arab.*, p. 88 (1775); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5066 (S. sericea); *Rohrb.*, *Monogr.*, p. 110.

β. MICROPETALA, *Coss. in Bourg. Pl. Algér. Rar.*, n. 229 (1856); *Batt.*, *Fl. de l'Algérie*, p. 136 (1888).

Petala reducta, laminis roseis.

Lusus 2. forma indumento longiore magis viscoso, floribus albidis.

Syn. S. villosa *var.* ismaëlitica, *Schweinf. in Asch. et Schweinf.*, *Illustr. Fl. d'Égypte, in Mém. Inst. Égypt.* ii. (1889) p. 748.

γ. DESERTICOLA, *Schweinf. exs.*, n. 53 (1880), *in Herb. Kew.* (*ined.*).

Densissime et asperule viscido-tomentosa. Caules foliosi multiflori. Folia trinervia, sed nervis pubescentiâ obscuratis.

Syn. Silene sp., n. 142, *Bromfield* (1851), Herb. Hook. in Herb. Kew.

Hab. Vadi Tumilât, near Ismaïlia, Lower Egypt.

Geogr. limits.—*N.* Palestine, near the Dead Sea (*Tristram*, Surv. West. Palest. Bot., p. 242).
S. Upper Egypt.
E. Mt. Sinaï, in Arabia Petræa.
W. Aïn Sefra, in the Algerian Desert.

β. Calyx fructifer apice contractus.

81. S. PENDULA, *Linn.*, *Sp. Plant.*, ed. I. p. 418; *Curt.*, *Bot. Mag.*, t. 114; *Rohrb.*, *Monogr.*, p. 111.

Adde: Caules decumbentes. Calyx vix umbilicatus. Filamenta glabra.

Adde syn. S. corsica (non *DC.*), *Sang.*, *Fl. Rom. Prodr. Alt.*, p. 769 (1855).

f. lepinensis, *Terracc. in Nuovo Giorn. Bot. Ital.* (1894), p. 153. Caules abbreviati, erecti nec decumbentes, parce ramosi. Folia ima dense rosulata, cetera minora rarioraque. Flores subunilaterales mediocres. Semina subrotundo-reniformia, tuberculato-hispida.

Hab. Mt. Lepini, near Rome.

Geogr. limits.—N. Near Rome.
E. Cyprus.
S. Djurdjura, in Algeria (*Debeaux*, *in Rev. Bot. France*, xi. (1893) p. 57).

D. Semina globosa, dorso convexa, faciebus plano-convexa. undique obtuse tuberculata.

a. Calyx fructifer apice non contractus, evenius.

82. Silene adscendens, *Lag.*, *Gen. et Sp. Pl.*, p. 15, n. 194 (1816); *Willk.*, *Ic. Desc. Pl. Nov. Hisp.*, i. p. 41, t. 27; *Rohrb.*, *Monogr.*, p. 111.

In mountain specimens the petals are larger.

Hab. S. Spain.

83. S. littorea, *Brot.*, *Fl. Lusit.*, ii. (1804) p. 186; *Willk.*, *Ic. Desc. Pl. Nov. Hisp.*, i. p. 49, t. 34 a; *Rohrb.*, *Monogr.*, p. 112.

β. elatior, *Willk.*, *l.c.*, t. 34 b; *Willk. et Lange*, *Prodr. Fl. Hisp.*, iii. p. 650; *Rohrb.*, *Monogr.*, p. 112 (S. littorea, *lusus* 2).

Species a *S. villosâ*, quâ confusa est, differt calycis dentibus lanceolatis obtusis et præsertim seminum formâ.

Geogr. limits.—N. Vigo Bay, in Galicia.
E. Iviza, in the Balearic Islands.
S. Coast of Andalusia.
W. Near Lisbon.

b. Calyx fructifer apice contractus, striis anastomosantibus.

84. S. psammitis, *Link*, *ap. Spreng.*, *Nov. Prov. Hal. Berol.*, p. 39; *Willk.*, *Ic. Desc. Pl. Nov. Hisp.*, p. 40, t. 25 (S. Agrostemma); *Rohrb.*, *Monogr.*, p. 113.

Nomen Linkii Rohrbach anteposuit, quod hæc forma est quasi intermedia inter *S. Agrostemmam* et *S. lasiostylam*, ita ut altera in alteram speciem Linkianam transeat neque varietates dignosci possunt. (Confer Ascherson in 'Bot. Zeitung,' xvii. 1859, p. 293.)

— Differt *S. psammitis* a *S. villosâ* et a *S. pendulâ* præsertim seminibus; *S. pendulæ* calyce fructifero ampliato, apice contracto, magis accedit, differt autem jam nervis anastomosantibus et capsulâ ovato-conicâ.

β. LASIOSTYLA, *Boiss.* (sp.), *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 79; *Willk., Ic. Desc. Pl. Nov. Hisp.*, i. p. 40, t. 26; *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 651.

Geogr. limits.—*N.* Sierra de Guadarrama, prov. of Old Castile.
S. Near Tangier, in Morocco.
E. Sierra de Segura, prov. of Murcia.
W. Portugal.

b. Dipterospermæ.

Semina rotundo-reniformia compressa, faciebus planiuscula, dorso alis duabus undulatis marginato profunde canaliculata. Flores in cincinnis simplicibus vel interdum geminatis.

a. Capsulæ carpophorum puberulum.

85. SILENE SERICEA, *All., Fl. Pedem.*, ii. p. 81, t. 79, f. 3 (1785); *Desf., Fl. Atlant.*, i. p. 352, t. 100 (S. bipartita); *Jacq., Fragm.*, t. 59 (S. hispanica); *Reichb., Ic. Fl. Germ. Helv.*, n. 5068 (S. vespertina); *Moris, Fl. Sardoa*, i. p. 253, t. 17, f. 1 (*var.* angustifolia); *Willd., Hort. Berol.*, fasc. ii. t. 23 (S. hirta); *Willk., Ic. Descr. Pl. Nov. Hisp.*, p. 45, t. 30 (S. bipartita *α* vulgaris, B: forma *parviflora*,), t. 31 (forma *angustifolia*), t. 32 (S. sericea); *Tanfani, in Parl. Fl. Italiana*, ix. p. 369; *Rohrb., Monogr.*, pp. 113–117 (S. sericea, et S. colorata, *Poir.*).

Hæc species polymorpha in duas subspecies divideatur:—

1. Subspec. S. colorata, *Poir.*
2. Subspec. S. Oliveriana, *Otth.*

1. Subspec. S. colorata, *Poir., Voy. en Barb.*, p. 163 (1798).

Folia inferiora obtusa. Calyx pilis adpressis plus minus longis vestitus, ad strias interdum lanuginosus, dentibus ovatis. Petala rosea, unguibus longe exsertis, lobis cuneato-oblongis raro lineari-oblongis, appendicibus oblongis acutisve.

Grex *a*. pubicalycina *Fenzl.* Caulis erectus vel adscendens; calyx pube brevissimâ ad strias adpressâ vix longiore vestitus, interdum inter strias glaber.

α. VULGARIS, *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 45, t. 30 A; *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 651.

Adde syn. S. saxicola, *Rouy, in Bull. Soc. Bot. France*, xxix. (1882) p. 43.
S. secundiflora, *Otth, in DC. Prodr.*, i. p. 375.

β. DECUMBENS, *Biv.* (sp.), *Sicul. Pl. Cent.*, i. p. 75, t. 6 (1806); *Sims, Bot. Mag.*, t. 677 (1803), (S. vespertina).

Grex *b*. trichocalycina, *Fenzl.* Caulis erectus vel adscendens; calyx ad strias pilis longis confervoideis pubescens, inter strias glaber.

γ. DISTACHYA, *Brot.* (sp.), *Fl. Lusit.*, ii. p. 189 (1804); *Phytogr. Lusit. sel.*, t. 71; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 45, t. 30, C.D. (S. bipartita *var.* lasiocalyx); *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 652.

δ. PTEROPLEURA, *Coss. in Bourg. Pl. d'Alg.* (1856), n. 224 (S. bipartita *var.* pteropleura).

Grex *c*. crassifolia, *Moris.* Caulis humilis decumbens. Folia carnosa suborbiculata vel spathulata. Cincinni pauciflori. Calyx totus pilis longis sericeis adpressis vestitus.

Syn. S. sericea *var.* crassifolia, *Moris, Fl. Sardoa*, i. p. 253, t. 17 (1837).

2. subspec. S. Oliveriana, *Otth, in DC. Prodr.*, i. p. 373.

Caulis adpresse vel patule pubescens. Folia omnia acuta linearia vel lanceolata; bracteæ lineares. Calyx ad strias pilis brevibus recurvis vestitus, inter strias scabridus, dentibus oblongis. Petala alba, unguibus paullum exsertis, lobis linearibus, appendicibus ovatis obtusis.

As the late Enrico Tanfani points out, the description of the seeds of *S. sericea* as given by Rohrbach is erroneous, and that they are exactly similar to those of *S. colorata;* this being so, there is no reason for separating the two species, and *S. sericea* being the older name becomes the proper name for this extremely variable and polymorphous species. He says: "Anche Rohrbach, il monografo del genere, guidato forse in errore dalla figura di Willkomm (*loc. cit.*, t. 32) nella quale il seme è rappresentato esageratamente sotto una forma cui talora si avvicina, ha creduto che la *S. sericea* non corrispondesse alla pianta tanto estesamente diffusa nella regione mediterranea e per la quale credè dover quindi

adottare il nome di *S. colorata.* Ma è indubitato che la pianta di Allioni non è altro che la comune *S. sericea* tanto abbondante in tutto il nostro littorale. Talora i semi in alcuni frutti mal sviluppati restano più piccoli, e con le ali meno ben sviluppate. Io in un medesimo frutto ho potuto osservare semi perfetti reniformi e semi striminziti e che assumevano forma paragonabile a quella di un orecchio." The iconography of this species has been more fully given in order to compare and estimate the value of the deviations from the type, and to avoid confusion from the overlapping descriptions in the discrimination of the various forms figured.

Geogr. limits.—N. Near Trieste, in Istria.
S. Abyssinia.
E. Near Teheran, in Persia.
W. Canary Islands.

86. SILENE GLAUCA, *Pourr. herb. ex Lag., Elench. Hort. Madrit.* (1803), *fide ej. Gen. et Sp. Nov.*, p. 15; (et sec. specim. ex horto Madritensi in herb. Link.); *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 42, t. 28; *Rohrb., Monogr.*, p. 117.

Adde: Flores erecto-patuli. Calyx striis virentibus vel purpurascentibus. Petala obovato-cuneata, unguibus inclusis.

Differt a *S. sericeâ*, bracteis fere æqualibus, calyce breviore fructifero valde ampliato umbilicato, striis latioribus superne venosis, petalis minus profunde bipartitis (bilobis), capsulâ globosâ, seminibus duplo majoribus.

Ex *syn.* S. secundiflora = S. sericea.

β. MINOR, *Rouy, Exc. Bot. Esp.*, ii. (1883) p. 63; *Willk., Prodr. Fl. Hisp., suppl.*, p. 279 (1893). Caulis humilis, 8–15 centim. longus, subsimplex 1–2-florus. Folia brevia, basilaria lanceolata, caulina inferiora anguste lanceolata, superiora linearia fere subulata. Flores minores.

Geogr. limits.—N. Near Barcelona, in Catalonia.
S. Algeria.
E. Balearic Isles.
W. Near Tangier, in Marocco.

87. S. GLABRESCENS, *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 133, t. 85.

Glabrescens. Caules 10–20 centim. longi, erecti vel laterales ascendentes, ad medium vel a basi ramosi, rarius simplices. Folia pilis ad tuberculum redactis, punctata, margine scabra, inferne longe et parce ciliata, inferiora obovata vel obovato-oblonga in petiolum latum attenuata, subrosulata,

caulina oblongo-lanceolata vel lanceolata subsessilia. Bracteæ foliis superioribus conformes, superiores valde inæquales. Flores suberecti vel erecto-patuli inferiores sæpius longe superiores breviter pedicellati in cincinnos simplices 2–7-floros dispositi. Calyx glaber tubulosus umbilicatus, fructifer tantum dilatatus, superne haud constrictus, albo-membranaceus, nervis viridibus vel rubentibus commissuralibus superne venulas plures emittentibus sed venulâ unicâ supremâ cum reticulo nervi sepalini confluentibus, dentibus ovato-triangularibus acutis albo-marginatis breviter ciliatis. Petala bipartita, lobis oblongis, unguibus subexsertis, appendicibus binis ovato-suborbiculatis, omnibus in coronam subcohærentibus. Filamenta glabra. Capsula ovato-oblonga, carpophorum subæquans.

Ab hâc plantâ *S. longicaulis* differt foliis pubescentibus, floribus parvulis, calyce basi attenuatâ, appendicibus parvulis acutis, capsulâ oblongâ carpophorum bis terve superante.

Hab. Marocco.

88. Silene longicaulis, *Pourr. ex Lag.*, *Elench. Hort. Madrit.*, 1803, *fide ej. Gen. et Sp. Nov.*, p. 15; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 61, t. 44 b; *Rohrb.*, *Monogr.*, p. 117.

Adde: Inconspicua. Caulis simplex vel furcato-ramosus, sæpe purpurascens. Flores erecto-patuli. Petala parvula, unguibus inclusis fauce in tubum connatis.

Geogr. limits.—*E.* Puerto Real, on S. coast of Spain.
W. Faro, on S. coast of Portugal.

b. Capsulæ carpophorum glabrum.

89. S. apetala, *Willd.*, *Sp. Plant.*, ii. p. 703 (non 307 ut passim), *et Herb.*, n. 8656 (1799); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5060; *Rohrb.*, *Monogr.*, p. 118.

β. alexandrina, *Asch.*, *Illustr. Fl. d'Égypte, in Mém. Inst. Égypte*, ii. (1889) p. 46.

Calycis nervi villis tuberculis insidentibus hirsuti.

Hab. Egypt; on the coast.

Geogr. limits.—*N.* Talavera, in prov. of New Castile, Spain.
S. Island of Korgo, in the Persian Gulf.
E. Afghanistan.
W. Canary Isles.

90. S. decipiens, *Barcelo, in Anal. Soc. Esp. Hist. Nat.*, viii. (1879) p. 340; *Fl. Isl. Baleares*, p. 61.

Caulis erectus e basi ramosus pubescens, 12–27 centim. longus. Folia uninervia, inferiora ovato-lanceolata in petiolum vaginantem attenuata, intermedia lanceolato-linearia acuta; bracteæ parvæ ovato-lanceolatæ, acutæ. Flores breviter pedicellati. Calyx tubulosus, fructifer ovato-oblongus, striis viridibus pilosis superne anastomosantibus, dentibus elongato-lanceolatis acutis margine scariosis. Petala bipartita rosea, lobis linearibus obtusis, appendicibus binis linearibus obtusis. Capsula ovato-cylindrica carpophorum sexies superans. Semina parva, faciebus concaviuscula, dorso obtuse canaliculata.

Hab. Majorca, in the Balearic Isles.

B. Species perennes.

a. Apterospermæ.

Semina reniformia vel auriformia, dorso nunquam alis undulatis marginato. Flores in cincinnis simplicibus.

A. Caules florigeri e basi rosulæ foliorum terminalis lateraliter edentes.

91. SILENE LEGIONENSIS, *Lag.*, *Gen. et Sp. Pl.*, p. 14, n. 188 (1816); *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 57, t. 51; *Rohrb.*, *Monogr.*, p. 118.

Adde: Flores sub anthesi patuli, postea erecti.

Geogr. limits.—*N.* and *W.* Cantabrian Mountains, in Galicia.
S. and *E.* Sierra de Segura, in prov. of Murcia.

92. S. ATLANTICA, *Coss. et Dur. in Bull. Soc. Bot. France*, ii. (1855) p. 307; *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 135, t. 86; *Rohrb.*, *Monogr.*, p. 119.

A *S. legionensi* differt, foliis rosulæ erectis obovatis vel oblongis in petiolum longum attenuatis, non patentibus lanceolatis vel lanceolato-linearibus in parte inferiore vix attenuatis, floribus majoribus in pseudoracemos 2–4-floros dispositis, capsulâ oblongâ, seminibus utrâque facie excavatis.

Hab. Algeria and Tunis.

B. Caules florigeri terminales, e rosulæ foliorum medio edentes (aut folia non rosulata).

a. Calycis dentes elongato-lanceolati acuti.

α. Flores calyce multo brevius pedicellati.

93. S. CHOULETTEI, *Coss. in Bull. Soc. Bot. France*, ix. (1862)

p. 169; *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 136, t. 87; *Rohrb., Monogr.*, p. 119.

A *S. atlanticâ* differt, caulibus caudicis ramulos terminantibus, foliis infimis in petiolum brevem attenuatis, pseudoracemis sæpius plurifloris non 2–4-floris, calyce tubuloso-infundibuliformi, stipite capsulæ longitudinem dimidiam superante.

Hab. Algeria.

94. Silene Hochstetteri, *Rohrb. in Bot. Zeitung*, xxv. (1867) p. 81; *Monogr.*, p. 120.

Hab. Abyssinia.

β. Flores calyce longius pedicellati.

95. S. Biafræ, *Hook. f. in Journ. Linn. Soc.* (*Bot.*), vii. (1864) p. 183; *Rohrb., Monogr.*, p. 120.

Hab. The Cameroons on the Bight of Biafra, German West Africa.

b. Calycis dentes obtusi, vel raro ovati acuti.

a. Herbæ nunquam cæspitem formantes.

96. S. Burchellii, *Otth, in DC. Prodr.*, i. p. 374; *Rohrb., Monogr.*, p. 120.

Syn. ? ? S. æthiopica, *Burm. f., Fl. Cap. Prodr.*, p. 13 (1768). (Fide speciminis manci in Herb. Kew.)

α. CERNUA, *Bartl.* (sp.) *in Linnæa*, vii. (1832) p. 623.

β. LATIFOLIA, *Sond., in Harv. et Sond., Fl. Capensis*, i. p. 128.

γ. PILOSELLÆFOLIA, *Cham. et Schlecht.* (sp.) *in Linnæa*, i. (1826) p. 41.

Adde syn. S. piloselloides, *G. Don, Gen. Syst.*, i. p. 404.

"Harvey, in his 'Fl. Capensis,' i. p. 128, does not quote and probably had not seen Burchell's n. 271, which was the type specimen of this species. Consequently he has described from other forms. On the other hand, *S. Thunbergiana* (*vide* Rohrb., 'Monogr.,' p. 121, n. 76), founded on their (Ecklon and Zeyher) n. 253, is obviously identical with Burchell's n. 271,—the last name, *S. Thunbergiana*, must therefore be suppressed. The forms hitherto commonly marked in herbaria *S. Burchellii*, Otth (see Burchell's nos. 580, 1254, 6789), and those of many recent collectors, must, I think, be regarded as a mere variety, with more erect habit, and generally tendency to narrower leaves—n. 271 being the maritime form, with broader leaves (see Gerrard's n. 605 from Natal), those forms are connected by intermediate states, but I can find no differences whatever in the calyx-teeth or fruit. Under these varieties and under various names (including *S. chirensis* and *S. sericea* of A. Rich., 'Tent. Fl. Abyssin.'), this

species extends very widely over Africa from the Cape to Abyssinia."—(*H. Bolus*, MS., in *Herb. Kew.*)

The above is a valuable note by Mr. Bolus on the type-specimens, though I am not inclined to sink *S. chirensis* and *S. sericea*, A. Rich., in the species. With this reservation, the distribution of the species is, however, not restricted to Cape Colony and Natal. It has recently been recorded for Griqualand East.

Geogr. limits.—*N.* and *E.* Mt. Kilima-Njaro, in German East Africa.
S. Plettenburg Bay, in Cape Colony (var. γ).
W. Huilla, in Angola; Portuguese West Africa (*Welwitsch*, herb., n. 1082).

97. SILENE PRIMULÆFLORA, *Eckl. et Zey.*, *Enum. Pl. Afr. Austr. Extratr.*, p. 32 (1835); *Rohrb.*, *Monogr.*, p. 122.
Hab. Cape Colony.

98. S. CRASSIFOLIA, *Linn.*, *Sp. Plant.*, ed. II. p. 597; *Rohrb.*, *Monogr.*, p. 122.
Hab. Natal.

β. Herbæ cæspitem densum formantes.

† Calyx evenius.

99. S. MUNDIANA, *Eckl. et Zey.*, *Enum. Pl. Afr. Austr. Extratr.*, p. 32 (1835); *Rohrb.*, *Monogr.*, p. 123.
Hab. Paardekop, near Plettenberg Bay, Cape Colony.

100. S. ELEGANS, *Link*, *ap. Brot. Fl. Lusit.*, ii. (1804) p. 185; *Willk.*, *Ic. Desc. Pl. Nov. Hisp.*, i. p. 71, t. 52 A; *Rohrb.*, *Monogr.*, p. 123.

Adde: Nana. Folia rosulata subenervia. Calyx rubellus membranaceus. Petala unguibus subauriculatis late alatis villoso-ciliatis. Capsula ovato-oblonga carpophorum æquans.

Differt a *S. ciliatâ*, cui valde affinis, præsertim calyce haud ampliato umbilicato evenio.

Syn. S. Campanula (non *Pers.*), *Lapeyr.*, *Hist. Abr. Pyren.*, p. 248.
S. Borderi, *Jord.*, *ex Rohrb.*, *Monogr.*, p. 137, n. 113; *Willk. et Lange*, *Prodr. Fl. Hisp.*, iii. p. 655.
S. punctata, *Bub. Herb.*, *ex Willk. et Lange*, *Prodr. Fl. Hisp.*, iii. p. 655.
S. Campoi, *Losc.*, *ex Tratad. Pl. Arag.*, ii. (1877) p. 23.

Geogr. limits.—*N.* Pyrenees (French side).
S. and *W.* Sierra d'Estrella, in Portugal.
E. Pyrenees (Spanish side).

†† Calyx striis bifurcatim conjunctis.

101. SILENE CILIATA, *Pourr. in Mém. Acad. Toul.*, iii. (1788) p. 328; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 58, t. 42 A (S. ciliata, *typ.* I. pyrenaicus).

Adde: Semina dorso canaliculata, nec plana.

α. GENUINA, *Rohrb., Monogr.*, p. 124.

β. GENICULATA, *Pourr.* (sp.), *l.c.*; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 59, t. 42 B (S. ciliata, *typ.* II. hispanicus); *Rohrb., Monogr.*, p. 124.

Geogr. limits.—*N.* Mt. Plomb de Cantal, in Auvergne, France (*var. α*).
S. and *E.* Mt. Olympus, in Thessaly, Greece (*var. α*).
W. Mt. Peñafurada, near Arvac, in prov. of Asturias (*var. β*).

b. Dipterospermæ.

Semina rotundo-reniformia, faciebus planiuscula, dorso alis duabus undulatis marginato profunde acute canaliculata. Flores in cincinnis laxis duplicibus vel triplicibus.

102. S. INTRUSA, *Wight et Arn., Prodr. Penins. Ind. Or.*, p. 42.

Caules valde et laxe ramosi erecti, inferne glabri superne scabri viscidi; florigeri terminales. Folia lanceolata obtusiuscula; bracteæ parvæ lanceolatæ dense ciliatæ. Flores breviter pedicellati, medio interdum abortivi. Calyx plus minus elongatus clavato-truncatus, fructifer paullum ampliatus infra capsulam leviter constrictus, umbilicatus, glanduloso-pubescens, nervis nigricantibus superne arcuatim conjunctis, dentibus lanceolatis acutis dense ciliatis. Petala rosea, magna, unguibus glabris exsertis, bipartita, lobis late ovato-oblongis, appendicibus binis oblongis. Capsula ovoidea carpophorum subæquans.

S. sericeam in memoriam ducit, non solum seminum formâ sed etiam toto habitu.

Syn. S. indica, var. *Wall.*, Cat., n. 642 E.
Melandryum intrusum, *Rohrb., Monogr.*, p. 233, *et in Linnæa*, xxxvi. (1869) p. 242.

This species was excluded by Rohrbach from the genus, as the capsule appeared to be unilocular, but Dr. T. Thomson has demonstrated the existence of septa; it is therefore here restored.

Hab. The Nilagiri Mts., in Malabar.

Sectio II. DICHASIOSILENE.

Herbæ perennes vel annuæ, paucæ biennes. Flores in dichasio simplici vel plus minus composito breviter vel longe pedicellati, dichasii ramis æqualibus aut inæqualibus, ramo altero in speciebus nonnullis in florem unum reducto; interdum flores dichasio contracto capitulum formantes, in speciebus perennibus multis, dichasii floribus plerisque abortivis, caulis uni-vel biflorus;—rarissime inter *Brachypodas* flores in racemo simplici paucifloro dispositi.

A. Species perennes, inter *Compactas* paucæ biennes vel annuæ.

a. Petala unguibus utrinque auriculatis.

Series 1. *Auriculatæ.*

Species alpinæ uni-vel bifloræ, petala unguibus utrinque dente obtuso vel acuto auriculatis.

A. Caules florigeri terminales.

a. Folia subulata vel falcata, interdum pungentia.

a. Calyx dentibus obtusis.

† Calyx striis anastomosantibus.

103. SILENE FALCATA, *Sibth. et Sm., Prodr. Fl. Græc.*, i. p. 301 (1806); *Fl. Græca,* v. p. 25, t. 436; *Rohrb., Monogr.*, p. 125.

Species ab affinibus capsulâ e calyce exsertâ distinctissima.

Hab. Mt. Kheshish-tagh (Mt. Olympus), in Anatolia.

104. S. MASMENÆA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. II. v. p. 57; *Rohrb., Monogr.*, p. 126.

Differt a *S. Echino* foliis tenuioribus ciliatis, calyce florifero tenuiori non clavato, capsulâ quam carpophorum longiore.

Hab. Masmeneu-dagh, Aslan-dagh, and Beryt-dagh, in the provinces of Karamania and Marasch; Asia Minor.

105. S. ARGÆA, *Fisch. et Mey. in Ann. Sc. Nat.*, Sér. IV. i. (1854) p. 36; *Rohrb., Monogr.*, p. 126.

Hab. Arjish-Dagh (Mt. Argæus), in prov. of Karamania.

106. SILENE MENTAGENSIS, *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 145, t. 94.

Caules 30–50 centim. longi, erecti, graciles inferne simplices vel fere a basi ramosi, superne dichotome ramosi, glabrescentes. Folia anguste linearia, acuta, glabrescentia; bracteæ lineares, inferne marginato-membranaceæ, ciliolatæ. Flores longe pedicellati, pedicellis quam bracteæ multo longioribus, in cymas laterales et terminales laxas dispositi. Calyx tubuloso-infundibuliformis glaber, fructifer ovatus vel subglobosus superne clavatus apice haud contractus, infra capsulam constrictus, albido-vel rubenti-membranaceus, nervis filiformibus, dentibus brevibus ovato-oblongis membranaceo-marginatis ciliatis. Petala livida, unguibus exsertis glabris dente parvo obtuso auriculatis, bifida, lobis oblongis obtusis, appendicibus binis parvis ovatis, integris inter se liberis. Filamenta glabra. Capsula ovoidea, superne acutata carpophorum scabrum æquans vel hoc sesquibrevior. Semina reniformia compressa, dorso faciebusque plana et tuberculorum præminentium seriebus echinatis.

Caulibus elatis dichotomis, calycibus fructiferis clavatis, *S. portensem* refert, sed ab hâc et ceteris speciebus ejusdem gregis *Rigidulæ* (series 9) caudice perenni eximie distincta.

Hab. Djebel Mentaga, in S.-W. Marocco.

107. S. RHYNCHOCARPA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 33; *Rohrb.*, *Monogr.*, p. 126.

Hab. Anatolia.

108. S. STENTORIA, *Fenzl*, *Pugill. Pl. Nov. Syr.*, p. 9 (1842); *Russegg.*, *Reise Illustr.*, t. 2; *Rohrb.*, *Monogr.*, p. 127 (S. caryophylloides).

Syn. Cucubalus caryophylloides, *Poir.*, *Encyc.*, *suppl.*, i. p. 416.

The older specific name is not only misleading but inappropriate; I have therefore followed Boissier (*Fl. Orient.* i. p. 619) in retaining Fenzl's name, by which all misunderstanding is avoided and the plea of convenience is sustained.

Geogr. limits.—*N.* and *E.* R. Euphrates, in prov. of Marasch.
S. Summit of Mt. Lebanon, in Syria.
W. Mt. Taurus, in Cilicia.

†† Calyx evenius.

109. SILENE TRAGACANTHA, *Fenzl, ap. Boiss., Fl. Orient.*, i. p. 621; *Rohrb., Monogr.*, p. 125.

Adde: Pedicelli medium versus vel infra calycem bracteati. Petala bipartita.

This plant has the habit and appearance of a species of *Tragacantha* or *Acantholimon*. Boissier's description is fragmentary, and, as he says, is drawn up from imperfect material, additional characters are here given from examination of specimens in Herb. Kew. Rohrbach's description was drawn up from specimens preserved in the Vienna Herbarium.

Hab. Mt. Kuh-Daëna, in S. Persia.

β. Calyx dentibus acutis, striis anastomosantibus.

110. S. ECHINUS, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. II. v. p. 56; *Rohrb., Monogr.*, p. 125.

A formis minoribus *S. subulatæ* præter petala foliis planis aceroso-pungentibus distincta.

Hab. Mt. Budrun, near the town of Isbarta, in Anatolia.

111. S. SUBULATA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 33; *Rohrb., Monogr.*, p. 127 (S. caryophylloides *var.* nardifolia *in parte*).

Caules cæspitosi erecti viscido-pubescentes pumili uniflori. Folia anguste linearia subtriquetra rigida subulata scabride pubescentia basi ciliata. Flores longe pedicellati, Calyx tubulosus glanduloso-pubescens, dentibus oblongis. Petala alba, unguibus exsertis dente acuto auriculatis, laminâ obcordatâ parvâ, appendicibus binis oblongis crenulatis. Capsula oblonga carpophorum glabrum æquans. Semina dorso granulata, leviter canaliculata, faciebus plana.

A *S. stentoriâ* differt præter folia tenuiora calyce post anthesin clavato, capsulæ adpresso nec turbinato.

Geogr. limits.—E. Baibout, in prov. of Erzeroum.
W. Gumuchkhane, in prov. of Trebizond.

112. S. PINDICOLA, *Haussk. in Mittheil. Thüring. Bot. Ver.*, v. (1887) p. 85; *et* Heft v. (1893) p. 50.

Caules cæspitosi erecti tenerrimi uniflori, in parte inferiore dense foliosi, in parte dimidiâ superiore bibracteati, inferne tenuiter papillosi, superne glanduloso-viscidi. Folia linearia acuta papilloso-scabriuscula basi dilatato-vaginantia sæpe subrecurva, in axillis plerumque ramulis sterilibus florendi tempore nondum evolutis munita. Calyx longe cylindrico-clavatus glaberrimus membranaceus roseo-suffusus, striis filiformibus, dentibus triangularibus albo-marginatis. Petala sordide fusca bipartita, lobis oblongis obtusis. Capsula oblongo-ovoidea, carpophoro glabro bis superata. Semina granulata.

Facies *S. Orphanidis*, quæ differt staturâ robustiore, foliis longioribus latioribusque nimis confertis, calycis dentibus latioribus, bracteis binis lanceolatis acutis ad calycis basin (nec flore nudo), capsulâ longiore.

Hab. Greece; the peak of Zygos, on Mt. Pindus, in Thessaly.

γ. Calyx dentibus alternatim acutis et retusis, striis apice anastomosantibus.

113. SILENE XYLOBASIS, *Freyn, in Bull. Herb. Boiss.*, iii. (1895) p. 100.

Dense pulvinaris. Caules pumili densissime cæspitosi erecti tenerrimi uniflori, superne glanduloso-viscidi. Folia basi dilatato-vaginantia pallida coriacea ciliolata, lanceolata, infima congesta, reliqua pauca distantia, suprema albo-marginata purpureo-suffusa. Calyx tubuloso-clavatus glaber umbilicatus pallidus, nervis rubellis, dentibus ovatis scarioso-marginatis ciliolatis. Petala livida bipartita lobis lineari-oblongis, unguibus exsertis, appendicibus binis trapezoideo-ovatis obtusis. Capsula ellipsoidea carpophoro bis superata.

Hab. Summit of Mt. Ak-dagh, in prov. of Siwas, near Amasia (July, 1891).

b. Folia mutica recta haud falcata.

a. Calyx dentibus obtusis, striis latis rubris superne anastomosantibus.

114. S. DIANTHIFOLIA, *J. Gay, ap. Tchihat., Asie Min. Bot.*, i. p. 193 (1860); *Rohrb., Monogr.*, p. 128.

Geogr. limits.—*N.* Mt. Beryt-dagh, in prov. of Marasch.
S. and *E.* Mt. Kuh-Delu, in S. Persia.
W. Mt. Taurus, in Cilicia.

115. S. ORPHANIDIS, *Boiss., Fl. Orient.*, i. p. 651; *Rohrb., Monogr.*, p. 128.

Adde: Semina ruguloso-tuberculata.

Hab. Mt. Athos, in Rumelia.

116. S. SARGENTI, *S. Wats. in Proc. Amer. Acad.*, xiv. (1879) p. 290; *B. L. Robinson, l.c.*, xxviii. (1893) p. 142.

Cæspitosa, multiflora, puberula, 15 centim. alt. Folia linearia vel oblanceolata. Calyx cylindricus, fructifer infra capsulam constrictus. Petala alba vel carnea, bifida, unguibus exsertis auriculis latis, laciniatim dentatis, laminâ obovatâ, appendicibus majusculis dentatis. Capsula cylindrica longe stipitata. Semina dorso cristato-tuberculata, faciebus levia.

Habitu *S. Douglasii* revocat, sed calyx haud inflatus.

Hab. Table Mtn., Monitor Range, N. Nevada.

117. SILENE HUMILIS, *C. A. Mey.*, *Enum. Pl. Cauc.*, p. 215 (1831); *Rohrb.*, *Monogr.*, p. 128.

Adde: Caules procumbentes vel adscendentes. Petala carnea vel sanguinea.

Hab. The Eastern Caucasus.

118. S. TACHTENSIS, *Franch. in Ann. Sc. Nat.*, Sér. VI. xv. (1883) p. 239.

E basi fruticulosâ, ramosissima, ramulis erectis inferne tenuissime puberulis. Folia oblongo-lanceolata acuta asperulata, inferne in petiolum longe attenuata; bracteæ lanceolatæ, margine albo-hyalinæ, lanuginosæ. Pedicelli calyce subbreviores. Calyx clavato-cylindricus membranaceus umbilicatus, dentibus brevibus fere orbiculatis subtiliter ciliolatis, marginibus late hyalino-membranaceis. Petala alba, unguibus glabris vix exsertis. Filamenta glabra. Capsula carpophoro bis superata.

Hab. Turkestan.

119. S. GRAYI, *S. Wats. in Proc. Amer. Acad.*, xiv. (1879) p. 291; *B. L. Robinson, l.c.*, xxviii. (1893) p. 143; *Coult.*, *Bot. Gazette*, xvi. (1891) p. 44, t. 6, f. 7–8.

Cæspitosa stricta pumila canescenti-pubescens viscidula pauciflora. Caules erecti, 12 centim. longi, superne parcius foliati. Folia oblanceolata. Flores 2–3 in caule. Calyx clavato-cylindricus, dentibus rotundatis. Petala carnea bifida, unguibus anguste auriculatis, appendicibus latis subintegris. Capsula ovoidea subsessilis.

Hab. California; Mt. Shasta, near the snow-line.

120. S. WATSONI, *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 143.

Cæspitosa, stricta, gracilis, superne glanduloso-puberula, inferne subglabra. Caules erecti simplices, 12–20 centim.

longi. Folia linearia vel anguste oblanceolata acuta, basi in petiolum vaginantem attenuata. Flores 1–3 in caule. Calyx ovatus, dentibus albo-marginatis. Petala alba vel rosea, bifida, appendicibus obtusis.

Syn. Lychnis californica, *S. Wats. in Proc. Amer. Acad.*, xii. (1877) p. 248.

Hab. California; Plumas and Sierra counties, Mt. Dana, and near Ebbett's Pass.

121. Silene Suksdorfii, *B. L. Robinson, in Coult., Bot. Gazette*, xvi. (1891) p. 44, t. 5, f. 9–11; *et in Proc. Amer. Acad.*, xxviii. (1893) p. 143.

Cæspitosa, stricta, pumila, inferne puberula, superne viscidula. Caules erecti, simplices, 7–8 centim. longi, superne parcius foliati. Folia radicalia subspathulata, caulina linearia, acuta. Calyx campanulatus. Petala alba, biloba, lobis obtusis, appendicibus oblongis retusis. Capsula subsessilis.

Geogr. range.—California to Washington.

β. Calyx dentibus acutis.

† Calyx striis anastomosantibus.

122. S. commelinifolia, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 35; *Rohrb., Monogr.*, p. 128.

Adde: Folia 5-nervia.

Geogr. limits.—*N.* and *W.* Turkish Armenia.
S. Persian Kurdistan (*Haussknecht, in Boiss., Fl. Orient., suppl.*, p. 99).
E. Mt. Elburz, in Persia.

123. S. Schlumbergeri, *Boiss., Fl. Orient., suppl.*, p. 106.

Glabra. Caules plurimi, erecti, tenues, foliosi, uni-vel rarius biflori. Folia lineari-setacea, stricta, subconvoluta, acuta, caulina tenuissima; bracteæ parvæ, lanceolatæ, acuminatæ. Pedicelli calyce triplo breviores. Calyx longe obconicus, membranaceus, glaber, striis purpureis, dentibus triangulari-lanceolatis, anguste albo-marginatis. Petala alba, biloba. Capsula oblonga, carpophoro sublongior. Semina ruguloso-tuberculata, dorso plana, faciebus subconvexa.

Affinis *S. dianthifoliæ* quæ rhizomate surculos steriles dense cæspitosos edente, foliis caulinis brevioribus, calycis dentibus ovatis obtusis, late albo-marginatis, petalis ultra medium bipartitis, differre videtur.

Hab. The Anti-Lebanon.

124. Silene Moorcroftiana, *Wall.*, *Cat.*, n. 626; *et ex Rohrb.*, *Monogr.*, p. 129.

Forma 1.—Altior gracilis, caule 2–3-floro.

Forma 2.—Nana, foliis linearibus, et pedicellis quam bracteæ longioribus (ex *Hook. f.*, *Fl. Brit. India*, i. p. 219).

Hab. W. Tibet, W. Himalayas, and Affghanistan.

125. S. persica, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 27; *Rohrb.*, *Monogr.*, p. 129.

Syn. S. erysimifolia, *Stapf*, *in Denkschr. Akad. Wien*, (1886) p. 284.

β. angistoma, *Boiss.*, *Fl. Orient.*, i. p. 622.

Caules 7–10 centim. longi, abbreviati. Flores submajores, calyce longiore. Species calycis dentibus spathulato-cucullatis notabilis.

Hab. W. Persia.

†† Calyx evenius.

126. S. brevicaulis, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 34; *Rohrb.*, *Monogr.*, p. 130.

Facies *S. depressæ* var. *Meyeri*, a quâ differt indumento glanduloso, foliis acutioribus, calyce evenio graciliore, ejusdem dentibus lanceolatis acutis, petalorum unguibus auriculatis, capsulâ longius ovatâ.

Hab. Prov. of Siwas, in Asia Minor.

B. Caules florigeri e foliorum rosulâ terminali lateraliter adscendentes. Calyx striis anastomosantibus.

127. S. Boryi, *Boiss.*, *Elench. Pl. Nov. Hisp.*, p. 19, n. 28 (1838); et *Voy. Bot. Esp.*, p. 94, t. 25 a; *Rohrb.*, *Monogr.*, p. 130.

Adde: Planta sordide virens vel canescens. Petala unguibus longe exsertis.

Hab. In the prov. of Granada; Sierra Nevada, Sierra de Ronda, and Sierra de Maria.

β. tejedensis, *Boiss.* (sp.), *Elench. Pl. Nov. Hisp.*, p. 20, n. 29; et *Voy. Bot. Esp.*, p. 94, t. 25 b; *Rohrb.*, *Monogr.*, p. 130.

Hab. In the prov. of Granada; Sierra Tejeda, Sierra de la Nieve, and Sierra Nevada; also on Mt. Makmel in the Lebanon, on Mt. Hermon in the Anti-Lebanon, and in the mountains of Syria, and Western Persia.

According to Cutanda ('Fl. Madrit.,' p. 178), *S. tejedensis* occurs also on the Sierra de Guadarrama, near Lozoya, in the prov. of New Castile. Willkomm says that he has not seen the specimens, and he thinks that this plant is scarcely likely to be found in the alpine districts of the elevated country in Central Spain, and recommends further observations in the locality mentioned, with the probability of its being identified with another species.

Boissier's 'Voyage Botanique,' containing the results of his exploration of the country in the year 1837, was issued in two volumes, with excellent coloured plates, during the years 1839–45.

Rohrbach considers Kotschy's specimens from Mt. Kuh-Daëna, in South-West Persia (exs., n. 768), as a deviation from the type, and includes them under *lusus* 2.

128. SILENE MELANDRIOIDES, *Lange, Diagn. Pl. Penins. Iber., in Kjöbn. Vidensk. Middel.*, 1877–78, p. 33; *Willk., Illustr. Fl. Hisp.*, i. t. 60.

Caules 16–25 centim. longi, adscendentes vel diffusi, glutinoso-et crispulo-villosi. Folia rosularia elliptico-lanceolata, in petiolum alato-dilatatum breviter angustata, caulina elliptico-ovata, basi angustato-amplexicauli-subconnata, summis ovatis, acuminata. Flores in dichasium regulare repetitum vel ter dichotomum dispositi, pedunculo centrali quam calyx longiore. Calyx primo cylindricus, dein ovato-campanulatus, ampliatus, basi truncatus, glanduloso-pilosus, dentibus subulato-acuminatis. Petala violaceo-rosea venis saturatioribus, bifida. Capsula carpophoro 3–4-plo longior. Semina reniformia, tuberculata, dorso plana.

Hab. Bussaco, near Coimbra, Portugal; and Orense, in Galicia, Spain.

129. S. CAUCASICA, *Boiss., Fl. Orient.*, i. p. 622; *Rohrb., Monogr.*, p. 131.

S. vallesia longius distat, indumento glanduloso, foliis caulinis longis, floribus longe pedunculatis, et calyce latiore: Ledebour autem (Fl. Ross., i, p. 321) dicit, "planta caucasica spontanea ab occidentali non diversa videtur."

β. MULTIFLORA, *Rupr., Fl. Caucasi*, p. 187; *Boiss., Fl. Orient., suppl.*, p. 99.

Major. Flores 3–5-terminales, conferti vel in 2–3-verticillastra remota dispositi: calyce sæpe eglanduloso.

Syn. S. repens, *Ledeb., Fl. Rossica*, i. p. 308, quoad Armeniam et Caucasum.

Hab. Trans-Caucasia.

130. SILENE VALLESIA, *Linn.*, *Sp. Plant.*, ed. II. p. 603; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5087*a*; *Rohrb.*, *Monogr.*, p. 131.

Adde: Petala supra roseo-violacea subtus virentia, unguibus ciliatulis. Filamenta glabra. Carpophorum puberulum.

β. GRAMINEA, *Rohrb.*, *Monogr.*, p. 131; *Vis.*, *Fl. Dalmatica*, iii. (1852) p. 166, t. 34 (S. graminea); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5087*β*.

Tanfani says that cultivated specimens of this variety are scarcely to be distinguished from the specific type, and that intermediate and connecting forms are to be met with.

Geogr. limits.—*N.* The Alps of Valais, Switzerland.
S. Montenegro (*var.* graminea); Mt. Durmitor, *Baldacci*, *Fl. exs. Crnaeg.* (1890).
E. Bosnia (*var.* graminea); (ex *Nym. Consp. Fl. Eur.*, p. 92).
W. The Alps of Dauphiny, France.

b. Petala unguibus exauriculatis.

Series 2. Macranthæ.

Species 1–3-floræ, floribus breviter raro longe pedicellatis; aut flores in dichasio duplici, aut dichasii ramo altero abbreviato in foliorum axillis geminati, calyce brevius pedicellati; calyx elongato-clavatus seu in speciebus paucis uni-vel bifloris, floribus longe pedicellatis, breviter clavatus.

A. Caules e foliorum rosulâ terminali lateraliter edentes.

131. S. PALINOTRICHA, *Fenzl*, *ap. Boiss.*, *Fl. Orient.*, i. p. 621; *Rohrb.*, *Monogr.*, p. 132.

Very similar to *S. Boryi.*

Hab. N. Persia; in the provinces of Mazanderan and Khorassan.

132. S. SCHAFTA, *G. Gmel.*, *Reise Russl.* (1774–1783), ex *Hohen.* in *Bull. Soc. Nat. Mosc.*, xii. (1838) p. 397; *Lindl.*, *Bot. Reg.* (1846) t. 20; *Rohrb.*, *Monogr.*, p. 132.

Species a seminibus echinatis et tempore florendi serotino insignis.

Hab. Russia, prov. of Trans-Caucasia; and Persia, prov. of Ghilân.

133. SILENE PYGMÆA, *Adams, in Weber et Mohr, Beitr.*, i. (1805) p. 59; *Rohrb., Monogr.*, n. 2, p. 78.

Caules sive rami florigeri adscendentes dense pubescentes. Folia radicalia rosulata, obovato-spathulata, mutica, in petiolum longum attenuata, pubescentia, ciliata; caulina minora elliptica, obtusa, in petiolum brevem attenuata; bracteæ et prophylla parvæ albo-marginatæ ciliatæ. Flores in dichasio paucifloro brevissime pedicellati, odoratissimi. Calyx anguste cylindricus evenius sanguineus vel pallidus, fructifer vix ampliatus infra capsulam constrictus, basi truncatâ leviter umbilicatus puberulus, dentibus obtusis albo-marginatis dense lanuginoso-ciliatis. Petala rosea, unguibus glabris, bipartita lobis oblongis, appendicibus binis magnis ovatis. Filamenta glabra. Capsula ovata carpophorum pubescens fere bis superans. Semina reniformia compressa, dorso canaliculata, margine rotundata, pluriserialiter cristato-echinulata, faciebus curvato-excavata.

Authentic specimens of this plant are seldom found in herbaria; descriptions of the species vary, and appear to be based upon the examination of imperfect material. In this case the description has been drawn up from specimens collected in the *locus classicus* by Ruprecht, and authenticated by him in Herb. Mus. Brit., with notes on his observations on the living plant in his 'Fl. Caucasi.' Apparently this plant is wrongly placed in the subgenus *Gastrosilene* by Rohrbach. The calyx is not inflated, and is without anastomosing nerves: this is easily demonstrated in the specimens preserved in Herb. Kew and Herb. Mus. Brit., and the Kew specimens certainly seem to be authentic, as they are verified by Ruprecht and labelled "Mus. Bot. Acad. Petrop." Further, nothing is said in the original description as to the presence of anastomosing nerves on the surface of the calyx.

Hab. In alpine districts of the Western Caucasus, in the prov. of Trans-Caucasia.

134. S. LONGITUBULOSA, *Engl., Pflanzenw. Ost.-Afr.*, Th. C., p. 176 (1895).

Glabra, 50 centim. alt. Caules adscendentes, ramulis 1–2-floris. Folia lineari-lanceolata, acuminata, glabra; bracteæ lanceolatæ, acutissimæ. Calyx elongato-infundibuliformis, 3 centim. longus, basi truncatus, glaber, dentibus semi-ovatis albo-marginatis, exterioribus acuminatis. Petala alba vel rosacea, subtus bruneo-venosa. Capsula oblonga, carpophoro bis terve superata.

Hab. Nordseite, in German East Africa, at an elevation of 3,200 metres.

135. SILENE HETERODONTA, *sp. nov.*

Glanduloso-pubescens. Caules diffusi vel a basi arcuatâ adscendentes, simplices vel infra medium dichotomo-bifurcati, ramo laterali altero dichotomiæ deficiente. Folia inferiora ovato-spathulata, in petiolum attenuata, apice rotundata obtusissima mucronulato-apiculata, hispido-ciliata, superiora angustiora sessilia. Flores solitarii. Calyx tubuloso-clavatus, hirtulo-pubescens, basi truncatus, fructifer dilatato-clavatus infra capsulam attenuatus vix constrictus, nervis rubellis vel viridibus sparse anastomosantibus, dentibus ovato-triangularibus, aliis acutis aliis obtusis, albo-marginatis, ciliatis. Petala biloba, lobis obovato-oblongis, unguibus exsertis, inferne ciliatulis, appendicibus bipartitis segmentis ovato-lanceolatis acutis. Capsula oblonga carpophorum pubescens ter superans. Semina compressa, faciebus auriculiformi-concaviuscula, dorso acute canaliculata, granulata. (*Herb. Kew.*, Atlas Expedition (1888), coll. *J. Thomson.*)

Speciei sequenti valde affinis, sed insigniter diversa. Hæcce differt,—in bifurcatione infra caulis medium, foliis apice magis rotundatis, calyce basi truncato infra capsulam attenuato, petalis bilobis nec bipartitis, appendicibus bipartitis, carpophoro pubescente breviore, seminibus dorso acute canaliculatis.

The name is derived from the dissimilar calyx-teeth.

Hab. Marocco; between Titula and Tizi-N-Telnet.

136. S. PARVULA, *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 137, t. 88.

Cæspitosa, parvula, brevissime puberula. Caules diffusi vel a basi arcuatâ adscendentes, rarius erecti, simplices vel rarius supra medium dichotomo-bifurcati, ramo laterali altero dichotomiæ deficiente. Folia radicalia rosulata, parvula, inferne longe attenuata, petiolo in squamam latam dilatato, oblonga vel ovato-spathulata, obtusa vel apiculata, caulina lineari-oblonga vel oblonga, brevius petiolata vel superiora sessilia, parte petiolari pilis longis ciliata. Flores solitarii. Calyx tubuloso-infundibuliformis umbilicatus, fructifer superne dilatato-subclavatus infra capsulam contractus, post anthesin apice haud contractus, membranaceus albidus vel rubescens, nervis rubescenti-violaceis sparse anastomosantibus, dentibus ovato-triangularibus, aliis acutis aliis obtusis, albo-marginatis, ciliatis. Petala bipartita, lobis oblongis, unguibus exsertis, appendicibus binis ovato-triangularibus. Filamenta glabra. Capsula oblonga carpophorum glabrum paullum superans. Semina minuta, reniformia, compressa, faciebus plana vel auriculiformi-concaviuscula, dorso obtuse canaliculata tuberculata.

A præcedenti inter alia differt, calyce vix tubuloso evidentius umbilicato, nervis anastomosantibus, dentibus alternatim acutis obtusisque, et carpophoro glabro.

Hab. Marocco.

137. SILENE CÆSPITOSA, *Stev. in Mém. Soc. Nat. Mosc.*, iii. (1812) p. 262; *Trans. Linn. Soc.*, xi. (1815) p. 412, t. 35; *Rohrb.*, *Monogr.*, p. 133.

Adde: Planta valde cæspitosa. Calyx evenius, petalorum unguibus exsertis.

Hab. Near Sudur, in the Kuban district of the Western Caucasus, in the prov. of Cis-Caucasia.

B. Caules e foliorum rosulâ terminali medio edentes.

a. Capsula globosa carpophoro ter quaterve superata.

138. S. DEPRESSA, *Bieb.*, *Fl. Taur. Cauc.*, i. p. 336 (1808); *Rohrb.*, *Monogr.*, p. 133.

β. MEYERI, *Fenzl* (sp.) in *Kotschy*, *Pl. Pers. Bor. ap. Boiss.*, *Fl. Orient.*, i. p. 623; *Rohrb.*, *Monogr.*, p. 133.

Hab. Trans-Caucasia and Persia.

139. S. PORTERI, *Post*, *in Boiss.*, *Fl. Orient.*, *suppl.*, p. 104.

Basi suffrutescens, cæspitosa, pruinoso-scabrida. Caules pauci humiles tenues simplices uniflori vel parce dichotomi 2–3-flori. Folia basilaria brevia, lineari-spathulata, intermedia acuta, superiora subulata, brevissima. Calyx anguste cylindricus glaberrimus membranaceo-coriaceus, fructifer clavatus, nervis rubris, dentibus ovato-triangularibus albo-marginatis ciliolatis. Petala bifida, lamina obcuneata coronata, unguibus exsertis. Capsula ovato-oblonga carpophoro brevior. Semina dorso canaliculata.

Hab. The peak of Ziaret-Dagh, on Mt. Amanus, prov. of Aleppo.

b. Capsula carpophorum æquans, vel plus minus superans.

a. Calyx evenius.

† Capsula carpophorum æquans.

140. SILENE SUCCULENTA, *Forsk., Fl. Aegypt. Arab.*, p. 66 (1775); *Delile, Fl. Aegypt.*, p. 89, t. 29; *Rohrb., Monogr.*, p. 134.

β. CORSICA, *Rohrb., l.c.; DC., Fl. Franç.*, iv. p. 756 (*S. corsica*); *Willk., Ic. Descr. Pl. Nov. Hisp.*, i, t. 39 B.

Geogr. limits.—*N.* Calvi, in Corsica.
S. Near Alexandria, in Egypt.
E. Near Sidon, in Syria.
W. S. Antioco, in Sardinia.

141. S. UHDEANA, *Rohrb., Append. alt. Ind. Sem. Hort. Berol.* (1867) p. 2; *Monogr.*, p. 134.

Hab. Mexico.

This species is omitted in 'Biologia Centrali-Americana.'

142. S. PAPILLIFOLIA, *sp. nov.*

Caules adscendentes, inferne retrorsum puberuli, superne glabri. Folia faciebus papillosa, margine ciliata, radicalia obovata vel ovato-lanceolata, acuta, ad basin longe attenuata, utrinque pubescentia; caulina linearia, magis acuta, sessilia, utrinque sparsim puberulo-hirsuta. Flores in dichasium compositum laxum dispositi, cymulis trifloris, breviter pedicellati. Calyx elongato-clavatus scaber, basi truncatus, striis viridibus, dentibus longe lanceolatis, acuminatis, albo-marginatis, ciliolatis. Petala alba bipartita, lobis oblongo-spathulatis, appendicibus binis. Capsula oblonga, carpophoro glabro. Semina valde compressa, dorso obtuse canaliculata, faciebus concava.

Hab. Erzinghan, Mt. Sipikor-Dagh, *Sintenis*, n. 1166 (1889).

143. S. THYMIFOLIA, *Sibth. et Sm., Fl. Græcæ Prodr.* i. p. 292; *Fl. Græca*, v. p. 8, t. 411; *Boiss., Fl. Orient.*, i. p. 648, *suppl.*, p. 106.

Caules lignosi prostrati e basi ramosi, ramis adscendentibus griseo-puberulis. Folia crassa, parva, ovata, acuta, hirta, in axillis fasciculata. Bracteæ parvæ, ovatæ, acutæ, glabræ, ciliatæ. Flores in cymis trifloris erecti breviter pedicellati. Calyx clavatus villoso-viscidus, nervis rubris, dentibus triangularibus.

Petala supra nivea subtus virescentia (vel rubicunda), cuneato-oblonga bifida lobis linearibus obtusis, appendicibus bifidis.

Species maritima, foliis carnosis.

Geogr. limits.—*S.* and *E.* Cyprus.
W. West coast of Anatolia.
N. Kila, near Constantinople (*Coumany, ex Boiss., Fl. Orient., suppl.*, p. 106).

144. SILENE MICROPHYLLA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser I. i. p. 33; *Rohrb.*, *Monogr.*, p. 135.

Species foliis parvis insignis.

Hab. N. Persia.

145. S. BURMANICA, *Coll. et Hemsl. in Journ. Linn. Soc.* (*Bot.*) xxviii. (1890) p. 23.

Caules erecti plus minusve aspere ferrugineo-pubescentes, robustiusculi, vix ramosi. Folia caulina asperula sessilia, ovato-oblonga vel lanceolata, interdum obovata vel spathulata, acuta vel acuminata, subtrinervia. Flores dichotomo-cymosi, pedunculis brevibus glanduloso-hirsutis. Calyx fere cylindricus glanduloso-hirsutus, dentibus brevibus ovato-oblongis, obtusis vel rotundatis. Petala inæqualiter quadrifida (lobis lateralibus minoribus interdum fere ad dentes auriculiformes reductis), lobis ovato-oblongis obtusis, appendicibus binis angustis elongatis. Capsula ovoideo-oblonga, longe stipitata. Semina hippocrepiformia, rugosa.

Hab. Shan Hills, in Upper Burma, at 1,200 metres; and Momyen, in prov. of Yun-nan, China.

146. S. CRETACEA, *Fisch. in Spreng., Syst. Veget.*, ii. p. 405; *Rohrb., Monogr.*, p. 135.

Geogr. limits.—*N.* and *E.* Siberia.
S. and *W.* R. Don.

147. S. INFIDELIUM, *Post, ap. Post et Autran, in Bull. Herb. Boiss.*, iii. (Apr., 1895) p. 154.

Glabra, basi multicaulis, 20–30 centim. alt. Caules rigidi geniculati superne 1–2-flori. Folia infima lineari-spathulata, cetera linearia longe acuminata. Calyx pallide viridis vel rubro-vittatus cylindricus dein clavatus, dentibus triangularibus late scarioso-marginatis. Petala pallida, unguibus dilatatis glabris paullum exsertis, lamina lineari-cuneata ultra medium bifida, lobis oblongis, appendicibus gibbosis. Capsula ovata. Semina triangularia, dorso canaliculata.

Hab. Mt. Gaiour-dagh, in prov. of Aleppo, *Post*, n. 304.

†† Capsula carpophorum bis quaterve superans.

148. SILENE ARGUTA, *Fenzl, Pugill. Pl. Nov. Syr.*, p. 8, n. 25 (1842); *Rohrb.*, *Monogr.*, p. 135.

β. ARMENA, *Boiss.*, *Fl. Orient.*, i. p. 618; *Rohrb.*, *Monogr.*, p. 136.

(S. arguta, *lusus* 2.)

Affinis *S. Aucherianæ*, foliis rigidis multinerviis, calyce argute nervoso, distincta.

Geogr. limits.—*N.* and *E.* Near Erzeroum, in Turkish Armenia.
S. and *W.* Mt. Taurus, in Cilicia.

149. S. SISIANICA, *Boiss. et Buhse, Aufzähl. Transkauk. Pers. Pfl.*, *in Nouv. Mém. Soc. Nat. Mosc.*, xii. (1860) p. 36; *Fl. Orient.*, i. p. 617, *et suppl.*, p. 98; *Rohrb.*, *Monogr.*, p. 136 (S. arguta *var.* sisianica).

Planta pilis deflexis breviter hirtula. Caules stricti superne parce et stricte ramulosi, tenues, angulati, foliosi. Folia lanceolata acuminata, stricta, trinervia; bracteæ e basi latiori lineari-setaceæ. Cymæ 3–5-floræ, pedunculis brevissimis. Calyx cylindrico-clavatus, membranaceus, ad nervos papillosus, dentibus oblongis obtusis. Petala alba, biloba, lobis oblongis, appendicibus binis oblongis truncato-retusis. Capsula oblonga, carpophoro pubescente 3–4-plo breviore.

S. repens est *S. sisianicæ* similis facie foliisque, nihilominus hæcce satis est a *S. argutâ* distincta.

Hab. Sisian, in Trans-Caucasia; and Mt. Schahu and Mt. Avroman, in Persian Kurdistan (*Haussknecht, in Boiss., Fl. Orient, suppl.*).

150. S. GRACILLIMA, *Rohrb. in Linnæa*, xxxvi. (1870) p. 679.

Caules debiles, filiformes, parum ramosi, decumbentes, ramis floriferis capillaribus, gracillimis, erectis, basi pilis paucis adspersi, ceterum glabri. Folia plana, lanceolata, longe acuminata, ad basin angustata ac breviter petiolata, glabra. Flos terminalis longissime pedunculatus. Calyx clavato-campanulatus, glaber, striis viridibus, dentibus lanceolatis acutis margine scariosis vix ciliolatis. Petala alba, unguibus glabris longe exsertis, laminâ oblongo-ovatâ bipartitâ, lobis oblongis, appendicibus binis magnis lanceolato-ovatis, obtusis. Capsula ovata carpophorum bis superans.

Syn. S. Saxifraga (non *Linn.*), *Thunb.*, *Fl. Japonica*, p. 184 (1784).

Ex habitu in affinitatem *S. Saxifragæ* numeranda est, hujus speciei formas depauperatas in memoriam revocat.

Hab. Prov. of Ouari, in the island of Nippon, Japan.

151. Silene Schmuckeri, *Wettst.*, *Beitr. Fl. Alban.*, p. 30, t. 2 (1892).

Suffrutescens basi ramosus. Caules laxi filiformes, tenues, adscendentes, superne foliati, breviter sed dense pilosi, superne non visciduli, 6–10-centim. longi. Folia lanceolata, acuta, fere uninervia, sessilia basin versus attenuata, tota pilis brevibus pilosa, itaque griseo-viridia; bracteæ parvæ lineares, acutæ, pilosæ, ad basin breviter albo-marginatæ. Flores terminales solitarii vel rarius bini, longe pedicellati. Calyx breviter clavatus membranaceus albido-rufescens, totus pilis minutis crispulis pubescens, nervis inconspicuis pallide virescentibus vel rubescentibus, dentibus obtusis late albo-marginatis ciliatis. Petala purpurea, biloba, lobis linearibus, appendicibus binis obtusis, unguibus inferne villosis, superne dilatatis.

Hab. Serdarica-Duran, in Albania, Turkey.

152. S. khasiana, *Rohrb. in Linnæa*, xxxvi. (1869) p. 258; *Hook. f.*, *Fl. Brit. India*, i. p. 221.

Caulis geniculatus adscendenti-erectus, hirtello-pubescens, subglandulosus. Folia late ovato-lanceolata, 3–5-nervia, sensim acuminata, glabrescentia dense serrulato-ciliata, superiora cum bracteis æqualia, minora. Flores pauci, aut solitarii, terminales, aut in dichasio paucifloro, floribus plerumque quam calyx longioribus, pedicellatis, interdum ramo florigero ex foliorum inferiorum axillâ accedente. Calyx oblongus scabrido-et glanduloso-pubescens, striis viridibus superne tantum conjunctis, dentibus lanceolatis acutis. Petala (alba vel) purpurea, unguibus calycem æquantibus glabris, laminâ parvâ bipartitâ, lobis obtusis, appendicibus binis parvis. Capsula oblonga carpophorum 5-plo superans. Semina dorso faciebusque granulata plana.

Ad nullam speciem habitu vel characteribus accedit, nulli affinis esse videtur.

Hab. Khasia, in Assam, at 1,500–1,800 metres.

153. SILENE VAGANS, *C. B. Clarke, in Journ. Linn. Soc.* (*Bot.*), xxv. (1889) p. 6, t. 2.

Pubescens. Rami vagantes vix scandentes. Folia lanceolata acuminata, basi attenuata, vix trinervia; bracteæ minutæ medium versus pedicellorum. Calyx cylindricus, infra capsulam deinde breviter contractus, basi truncatus, pubescens, dentibus lanceolatis acutis. Capsula ovoidea carpophorum bis terve superans. Semina dorso faciebusque convexa, tuberculata.

Ad *S. khasianam* affinis, sed magis pubescens, foliis basi attenuatis, cymis compositis plurifloris, et seminibus convexis.

The characters not mentioned in the original description of the species are based upon an examination of the type-specimens in Herb. Kew.

Hab. Kohima, in Assam, at 1,650 metres.

β. Calyx striis anastomosantibus.

† Calyx dentibus obtusis.

154. S. OREOPHILA, *Boiss., Fl. Orient*, i. p. 617; *Rohrb., Monogr.*, p. 136.

Corrige et adde: Caules triflori; folia anguste linearia subtrinervia subobtusa nec acuta striæ calycinæ rubræ.

A *S. Aucherianâ*, cui arcte affinis, differt floribus quam calyx carpophorumque excedentibus.

Hab. Turkey in Asia: Mt. Ali-dagh, in prov. of Marasch; Mt. Ananias-dagh, in Anatolia, *Whittall* (1893); Mt. Yildiz-dagh, in prov. of Siwas, *Bornmüller*, Plant. Anatoliæ Orient. (1890).

155. S. AUCHERIANA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 27 (ex parte), et viii. p. 87; *Fl. Orient.*, i. p. 617; *Rohrb., Monogr.*, p. 36.

β. VISCOSA, *Freyn et Sint. in Oesterr. Bot. Zeitschr.*, xli. (1891) p. 364.

Multicaulis, ramosissima, basi suffruticosa. Folia elliptico-lanceolata scabrido-pubescentia, sparse glandulosa (nec velutino-hirsuta). Panicula cum calycibus glandulosa. Capsula carpophoro subæquilonga.

Habitu et facie species *S. Montbretianam* revocat.

Geogr. limits.—*N.* and *W.* Prov. of Van, in Turkish Kurdistan.
S. Mountains of Elwend, Persia.
E. Mt. Elburz, Persia.

156. SILENE NURENSIS, *Boiss. et Haussk. in Boiss., Fl. Orient., suppl.*, p. 99.

Cæspitosa, pumila, breviter glanduloso-pubescens. Rhizoma ramulosum induratum. Rami tenues fere a basi patule dichotome 3–7-flori, flore alari longiuscule pedunculato. Folia minima sessilia, infima lineari-spathulata obtusa, dichotomiarum bracteæque ovatæ acutiusculæ. Calyx anguste cylindricus, umbilicatus, papillis glandulosis sparsis obsitus, nervis rubris, dentibus ovatis. Petala albida, unguibus glabris, laminâ ad $\frac{1}{3}$ partem bilobâ, lobis obtusis. Capsula oblonga carpophorum æquans. Semina rugulosa, dorso vix canaliculata, faciebus subconcava.

Habitu refert *S. pruinosam*, sed calyx duplo longior, ungues non ciliati quamvis edentuli esse videantur.

Hab. Mt. Kuh-Nur, in S.-W. Persia.

157. S. CAPILLIPES, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. II. v. p. 55; *Rohrb., Monogr.*, p. 137.

Corrige: Caules e rhizomate cylindrico plures adscendentes (nec procumbentes).

Hab. Cilicia.

158. S. CAMPANULA, *Pers., Syn. Pl.*, i. p. 500 (1805); *All., Auct. Fl. Pedem.*, p. 28, t. 3 (1789) (Cucubalus alpestris); *Rohrb., Monogr.*, p. 137.

Adde: Calyx umbilicatus. Filamenta glabra. Semina dorso granulata canaliculata, faciebus plana.

By the strict application of the canons of priority, this species might be cited by the name of *S. alpestris*, since *Silene alpestris*, Jacq. (of 1773), is to be referred to the genus *Heliosperma*: but it is not worth while, from the point of view of convenience, to change Persoon's name, which has been in circulation for 90 years. And, on the other hand, *Silene campanulata*, S. Wats., should stand, as the slight difference in spelling is sufficient, though it might not satisfy the more critical nomenclaturists.

Hab. Piedmont.

159. S. SAXIFRAGA, *Linn., Sp. Plant.*, ed. I. p. 421; *Reichb., Ic. Fl. Germ. Helv.*, n. 5095; *Rohrb., Monogr.*, p. 138.

Species valde polymorpha et difficillime circumscribenda.

Adde syn. S. Notarisii, *Cesati, in Bibl. Ital.*, xci. (1838) p. 346; *Rohrb., Monogr.*, p. 140.

β. HISPANICA, *Rouy, in Bull. Soc. Bot. France*, xxix. (1882) p. 43.

Caules breviores. Folia punctulato-scabrida oblongo-spathulata vel oblongo-lanceolata, basi rosulata. Bracteæ ovato-lanceolatæ, omnino scariosæ. Capsula carpophoro sesquilongior.

γ. SMITHII, *Rohrb., Monogr.*, p. 138; *Boiss., Diagn. Pl. Nov. Or.*, Ser. II. i. p. 76 (S. Smithii); *Sibth. et Sm., Fl. Græca*, iv. p. 79, t. 389 (Saponaria cæspitosa).

At first referred to *Saponaria*, as the original specimens appeared to have only two styles.

δ. OREADES, *Rohrb., Monogr.*, p. 139; *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 92 (S. Oreades).

Geogr. limits.—*N.* W. Switzerland.
W. Prov. of Asturias, Spain.
S. Mt. Ghei-dagh, above Alaya, in Cilicia.
E. Mt. Stavros, in prov. of Karamania.

160. SILENE BARBEYANA, *Heldr. ap. Boiss., Fl. Orient., suppl.*, p. 107.

Stirps dense pulvinaris. Caudiculi petiolis vetustis, imbricatis, congestis vestiti. Folia radicalia, anguste linearia, acuta, margine scabridula. Caules floriferi filiformes, uniflori, pumili. Calyx breviter turbinatus, glaber, nervis rubellis, dentibus ovatis late membranaceis. Petala rosea obcordata, unguibus glabris, laminâ cum calyce subæquilongâ, appendicibus binis ovatis. Capsula oblonga, carpophoro brevissimo.

Hab. Mt. Korax, up to 2,200 metres, in the nome of Ætolia, Greece.

†† Calyx dentibus alternatim acutis et obtusis.

161. S. FRUTICULOSA, *Sieber*, pl. exs., *et DC. Prodr.*, i. p. 376 (1824); *Rohrb., Monogr.*, p. 139.

Species arcte affinis *S. Saxifragæ*, sed calycis dentibus alternatim acutis et obtusis, petalis fere totis e calyce exsertis et calyce fructifero carpophoro dense adpresso, satis differre videtur. Sunt autem etiam *S. Saxifragæ* formæ capsulâ fere totâ e calyce superne dilacerato exsertâ.

Adde syn. S. gymnotheca, *Panc. exs.*

Geogr. limits.—*N.* The Styrian Alps, in Austria.
S. and *E.* Mt. Ida, in Crete.
W. Lake of Iseo, in Lombardy.

162. SILENE FILIPES, *Freyn et Sint. in Bull. Herb. Boiss.*, iii. (1895) p. 98.

Dense cæspitosa, glabra vel inferne brevissime retrorsum scabridula, superne haud viscida. Caules filiformes erecti, vel e basi arcuatâ, geniculate-adscendentes, foliosi, ramosi, ramis tenuissimis erectis bracteatis unifloris. Folia elevatim punctata, lanceolato-linearia, acuta, rigida, infimorum vaginâ pallidâ, coriaceâ, dilatatâ, margine ciliato-asperâ. Flores solitarii, pedunculis calyce longioribus vel subæquantibus filiformibus. Calyx tubuloso-clavatus umbilicatus glaber, pallido-purpurascens, dentibus ovatis, membranaceo-marginatis, ciliolatis. Petala luteo-virescentia, bipartita, lobis lineari-oblongis, appendicibus binis parvis triangularibus, unguibus glabris, superne dilatatis. Capsula ellipsoidea, carpophoro sublongior inclusa.

A præcedenti distinguitur caule haud viscido et capsulâ inclusâ.

Hab. Turkish Armenia; Gumuchkhane and Mt. Argyri-dagh (June, 1894).

††† Calyx dentibus acutis.

163. S. MULTICAULIS, *Guss.*, *Pl. Rar. Sic.*, p. 172, t. 35 (1826); *Sibth. et Sm.*, *Fl. Græca*, v. p. 14, t. 420 (S. inaperta); *Rohrb.*, *Monogr.*, p. 139.

Facie affinis *S. linifoliæ*, sed basi non lignosa, inflorescentia non cymoso-paniculata, calyx longior basi valde angustatus.

Bertoloni and Rohrbach have confused this plant with *S. Notarisii* of Cesati, which is only a local form of *S. Saxifraga*. Rohrbach also mentions the absence in this species of anastomosing nerves in the calyx, and that the teeth are alternately acute and obtuse; but an examination of authentic specimens shows that the nerves of the calyx do not anastomose, and the teeth seem to be all acute, with occasional variations. For this reason I have transferred the species to another group, and reduced *S. clavata* (n. 117) to a variety of it. It is quite possible that the teeth of the calyx in the preceding species may be found to be only an occasional variation, and that they are either all acute or all obtuse; if so, there is no necessity for continuing to keep *S. fruticulosa* distinct and in a separate group.

β. CLAVATA, *Hampe, in Flora*, xx. (1837) p. 233 (S. Saxifraga *var.* clavata); *Waldst. et Kit.*, *Pl. Rar.*, ii. p. 177, t. 163 (S. Saxifraga); *Rohrb.*, *Monogr.*, p. 140 (S. clavata).

Folia mucronata; bracteæ lanceolatæ. Calyx nervis virentibus vel variantibus rubris. Petala alba, appendicibus brevibus.

S. multicaulis var. *megaspilæa* (of Boiss., 'Fl. Orient.,' i. p. 651), may possibly be referred to this variety: a form found in a locality which marks the south limit of the species.

Geogr. limits.—*N.* The Apennines of Central Italy.
S. Megaspilæon, in the nome of Achaia, Greece.
E. Island of Samothraki, in the Turkish Archipelago (*Von Degen*, 1891).
W. Corsica.

164. SILENE MACROPODA, *Velen. in Abh. Böhm. Ges. Wiss.*, VII. i. (1886) n. 8, p. 8, *et Fl. Bulgarica*, p. 64.

Glabra, densissime cæspitosa, rhizomate lignoso ramoso. Caules 30 centim. longi, recti, tenues, superne visciduli, foliosi, apice in racemum laxum pauciflorum abeuntes. Folia setaceo-linearia margine serrulato-ciliata; bracteæ setaceæ. Pedicelli calycem subæquantes. Calyx lineari-elongatus, apice clavatus, nervis viridibus, dentibus ovato-triangularibus, late albo-marginatis. Petalorum lamina virens cuneata, bifida. Antheræ violaceæ. Capsula ellipsoidea, carpophoro bis brevior.

Hab. Bulgaria; Mt. Vitos, near the city of Sofia, Mt. Rilo, and Mt. Osogovska Planina.

165. S. INCURVIFOLIA, *Kar. et Kir., Enum. Pl. Fl. Altaïcæ*, n. 160, *in Bull. Soc. Nat. Mosc.* (1841), p. 391; *Rohrb., Monogr.*, p. 141.

S. incurvifolia differt a *S. argutâ*, quâcum a cl. Fenzl confusa est, calyce toto glanduloso-hirto, nervis anastomosantibus, dentibus acutis, capsulâ oblongo-conicâ carpophorum æquante neque eo pluries longiore.

β. TURKESTANICA, *Regel* (sp.), *in Act. Hort. Petrop.*, ii. (1873) p. 436.

Parce ramosa, dense glanduloso-pilosa. Calyx fructifer paullo clavatus, nervis viridibus, dentibus inæqualibus. Petala extus violascentia, unguibus glabris exsertis, fauce coronatis, appendicibus denticulatis.

Hab. Near Ajagus, in the desert of Soungaria, and Mt. Alatau, in Turkestan.

166. S. ACUTIFOLIA, *Rohrb., Monogr.*, p. 141.

Differt a *S. fœtidâ* jam primo aspectu, calycibus dimidio brevioribus, et petalorum formâ.

Hab. Serra da Estrella, in Portugal.

167. SILENE FŒTIDA, *Link, ex Spreng., Syst. Veget.*, ii. p. 406, *et Willd., Herb.*, n. 8610; *Willk., Illustr. Fl. Hisp.*, t. 61; *Rohrb., Monogr.*, p. 141.

Adde syn. S. fuscata *var.* (Brot.).
S. Herminii, *Welw. ap. Rouy, in Le Naturaliste* (1888), p. 43.

Hab. Pico de Arvas, in prov. of Asturias, and Serra da Estrella, in Portugal.

168. S. MAXIMOWICZIANA, *Rohrb. in Linnæa*, xxxvi. (1870) p. 680.

Stirps pilis brevibus reversis hirsuta. Caulis repens, laxus, ramos florigeros permultos erectos humiles graciles subsimplices, 8–10 centim. longos edens, atque ipse apice adscendens floribusque terminatus. Folia lanceolata vel lineari-lanceolata attenuato-acuminata, ad basin versus angustata quasi-petiolata, margine serrulato-ciliolata, utrinque scabrido-punctulata. Flores solitarii vel bini. Calyx subampliatus, oblongo-clavatus, viridi-rubellus, striis superne anastomosantibus, dentibus lanceolatis anguste scarioso-ciliolatis. Petala rosea, unguibus glabris, longe exsertis, laminâ oblongo-obovatâ, bifidâ, lobis oblongis, appendicibus bipartitis oblongo-lanceolatis obtusis. Capsula ovato-oblonga carpophorum quater superans. Semina reniformia, compressa, faciebus plana, dorso plana, margine (*Heliospermatis* fere modo) tuberculorum magnorum cristâ irregulariter ornato.

Lusus 1; *Maxim. in Bull. Acad. Sc. Pétersb.*, xxxii. (1888) p. 482.

Nana, etiam ad calyces pubescens; flores solitarii vel bini.

Lusus 2; *Maxim.*, *l.c.*

Major, fere duplo altior, glaberrima; dichasium pluriflorum. Species, seminum indumento valde insignis, *S. Schaftæ* admodum affinis, differt autem jam primo aspectu caulibus florigeris non infrarosularibus calycibusque ampliatis; præterea *S. repentem* revocat basibus cauliculorum procumbentibus.

Hab. Mt. Motoyama, prov. of Kai, in the island of Nippon, Japan.

169. S. CORDIFOLIA, *All., Fl. Pedem.*, ii. p. 82, t. 23; *Reichb., Ic. Fl. Germ. Helv.*, n. 5089; *Rohrb., Monogr.*, p. 142.

Hab. The Alps of Piedmont.

170. SILENE LAZICA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 35; *Rohrb.*, *Monogr.*, p. 142.

Hab. Turkish Armenia.

Rohrbach's next series, viz., *Polyschemone*, includes only one species, *S. nivalis*. As has been pointed out in the Introduction to this revision, I have considered it to be better to exclude from the genus those species which have 5 styles, in which, of course, the capsule is 5-septate at the base, and to distribute them if possible among allied genera. Some botanists, especially those with analytical bias, would prefer to maintain Schott's original genus, and to consider *Polyschemone nivalis* as the type of the genus, of which Schott gives a very complete description in *Analecta botanica*, i, p. 56 (1854). The plant was first described as a *Lychnis* by Kitaibel in 1814, and in the most recent floras is included in *Melandryum*.

Series 3. *Nanosilene.*

Species nanæ unifloræ: calyx campanulatus.

171. S. ACAULIS, *Linn.*, *Sp. Plant.*, ed. II. (1762) p. 603; *Sp. Plant.*, ed. I. p. 415 (Cucubalus); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5084; *Rohrb.*, *Monogr.*, p. 143.

a. GENUINA.

Calyx umbilicatus. Petala profunde emarginata. Capsula oblongo-cylindrica e calyce longe exserta. Semina parva.

Adde syn. S. alpina, *S. F. Gray*, *Nat. Arr. Brit. Pl.*, ii. p. 643.

Forma SUBACAULESCENS, *mihi*:—subacaulescens, foliis anguste linearibus 25–35 mm.

Hab. United States; Rocky Mts. of Colorado, and in Arizona.

β. BRYOIDES, *Jord.* (sp.), *Pugill.*, *Pl. Nov. in Mém. Acad. Nat. Lyon*, 1851, p. 241; *Obs. Pl. France*, v. p. 35, t. 1; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, p. 70, t. 51 A.

Calyx haud umbilicatus, sed in pedunculum angustatus. Petala emarginata. Capsula e calyce brevius exserta. Semina majora.

Syn. S. acaulis, *Willk. in Flora*, xxxiv. (1851) p. 601.

Hab. Alps of Dauphiny and Savoy; Spanish Pyrenees, Mt. Izas, Mt. Soba, and the Baths of Panticosa, in prov. of Aragon (*ex Willk. et Lange*, *Prodr. Fl. Hisp.*, iii.); Switzerland, Plans de Iaman in canton of Vaud, and Albula Pass in canton of Grisons (*ex Nym.*, *Consp. Fl. Eur.*, *suppl.*).

γ. EXSCAPA, *All.* (sp.), *Fl. Pedem.*, ii. p. 83, t. 79 (1785); *Jord.*, *Obs. Pl. France*, v. p. 35, t. 1.

Syn. S. acaulis *var.* parviflora, *Otth, in DC. Prodr.*, i. p. 367.
S. polytrichoides, *Zumagl., Fl. Pedem.*, ii. p. 269 (1860).
S. acaulis, *lusus* 2, *Rohrb., Monogr.*, p. 144.

Hab. Dept. of Alpes-Maritimes in France, and adjacent localities in the Spanish Pyrenees (*ex Willk. et Lange, Prodr. Fl. Hisp.*, iii.); the Alps of Piedmont, and of the adjacent canton of Valais, in Switzerland (*ex Nym., Consp. Fl. Eur., suppl.*); near Rodna, in Transsylvania, *F. Porcius* (1878).

Geogr. range.—Arctic and N. temperate zones, north of lat. 35°, as far north as lat. 74°, according to Nordenskiöld's 'Voyage of the Vega'; also in Novaya Zemlya, lat. 73° (*Ekstam*, 1895).

172. SILENE BAUMGARTENI, *Schott et Kotschy, Pl. Exsicc. Transsilv.*, n. 459; *Reichb., Ic. Fl. Germ. Helv.*, n. 5114; *Rohrb., Monogr.*, p. 144 (S. dinarica).

Syn. S. depressa, *Baumg., Enum. Stirp. Transsilv.*, i. (1836) p. 404.
S. dinarica, *Spreng., Syst. Veget.*, ii. p. 405.
Saponaria Baumgarteni, *Janka, in Linnæa*, xxx. (1859–60) p. 559.

Sprengel's name is passed over, being bad and inadmissible, as the plant does not occur, and has never been found, in the Dinaric Alps. According to Kotschy the specific name is founded upon a geographical error, and therefore cannot stand.

Hab. Transsylvania, and the Banat, in Hungary.

Series 4. *Brachypodæ.*

Species montanæ caulibus strictis: flores solitarii vel bini longissime pedicellati, vel in dichasio simplici laxo; calyx sub anthesi clavatus, fructifer oblongus; capsula carpophorum multies, raro tantum bis, superans.

a. Caules florigeri e basi rosulæ foliorum terminalis lateraliter edentes.

173. S. GRISEA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. vii. p. 88; *Rohrb., Monogr.*, p. 145.

Jam primo aspectu a *S. flavescente* dignoscenda capsulis cernuis.

The seeds are incorrectly described by Rohrbach; I have examined and compared the seeds of authentic specimens, and their character should be amended as follows:—" Semina tenuiter rugulosa, auriculiformia, compressa,

dorso granulato subcanaliculata vel fere plana, faciebus concaviuscula." This character still further serves to distinguish the plant from the next two species.

Hab. Syria; Mt. Lebanon.

174. SILENE LEPTOCLADA, *Boiss.*, *Fl. Orient.*, i. p. 647; *Rohrb.*, *Monogr.*, p. 145.

Differt a priori, jam primo aspectu floribus longe pedicellatis, calycis striis anastomosantibus, dentibus obtusis, petalis breviter bifidis.

Hab. Near Elmalu, in Anatolia.

b. Caules e foliorum rosulæ medio edentes (terminales).

α. Flores solitarii vel bini, longissime pedicellati.

175. S. FLAVESCENS, *Waldst. et Kit.*, *Pl. Rar. Hung.*, ii. p. 191, t. 175 (1804); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5090; *Rohrb.*, *Monogr.*, p. 146.

According to Simonkai, the record of its occurrence in Transsylvania is erroneous. Rohrbach has joined with this species *S. thessalonica*, Boiss. et Heldr., but it seems better to separate it on account of the disposition of the flowers and other well-marked characters.

Geogr. limits.—*N.* Hercules-bad, in Banat, Hungary.
S. Island of Thasos, off the coast of Rumelia (*Bornm. et Sint.*, n. 585, sub *S. thessalonica*).
E. Szaszkam, near Be, in Wallachia.
W. Croatia.

176. S. MONERANTHA, *mihi.*

Syn. S. monantha, *Boiss. et Haussk. in Boiss.*, *Fl. Orient.*, *suppl.*, p. 99 (1888); non S. monantha, *S. Wats.* (1875).

Glanduloso-pubescens cæspitosa pumila. Caules stricti erecti simplices foliosi. Folia infima oblongo-spathulata in petiolum attenuata, cetera sessilia, latiora, ovato-cordata, amplexicaulia, mucronata. Calyx cylindrico-clavatus, umbilicatus, papillis albis hirsutus, striis virentibus, dentibus ovatis, acutis, albo-marginatis, fructifer nutans infra capsulam constrictus. Petala pallida, cuneata, biloba, unguibus exsertis, appendicibus truncatis 4-dentatis. Capsula oblonga, carpophorum 5–6-plo superans.

Ex affinitate *S. cordifoliæ* et *S. lazicæ*, floribus solitariis et calyce post anthesin nutante insignis.

The spelling of the name of this species has been slightly altered, as the name selected by Boissier is pre-occupied by a North American species described by the late Sereno Watson in 1875.

Hab. Mt. Sindjar, in Mesopotamia.

177. SILENE FLAMMULÆFOLIA, *Steud. in Schimp., Iter Abyss.*, II. n. 676, *et A. Rich., Tent. Fl. Abyss.*, i. p. 43 (1847); *Rohrb., Monogr.*, p. 146.

Hab. Mt. Silke, in the district of Semen, Abyssinia.

β. CANESCENS, *mihi.*

Planta incano-pubescens; calycis nervis scabro-pubescentibus inter nervos subglabris, dentibus triangulari-ovatis, acutis.

Syn. S. flammulæfolia, *Barbey, Pl. Arabic. Schweinf.* (1889), *in Herb. Kew.*

Hab. Gebel Schibam, above Menacha, in Arabia Felix.

β. Flores in dichasio laxo quasi pseudoracemosi.

178. S. THESSALONICA, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. II. i. p. 74.

Velutino-canescens superne glanduloso-viscida, basi suffrutescens. Caules adscendentes e basi ramosi superne breviter ramulosi. Folia rosularum inferioraque oblongo-spathulata, in petiolum attenuata, superiora linearia; bracteæ late albomarginatæ ciliatæ. Florum pedicelli calycem æquantes. Calyx cylindricus glanduloso-hirsutus, fructifer clavatus, evenius, striis viridibus, dentibus ovato-lanceolatis acutis. Petala ochrolenca bifida, lobis linearibus, appendicibus binis parvis, ovatis, obtusis. Capsula oblonga, carpophorum 4-plo superans. Semina dorso granulato canaliculata, faciebus plana striata.

Syn. S. flavescens *var.* pluriflora, *Griseb. in Herb. Vindob.*
S. flavescens, *lusus* 2, *Rohrb., Monogr.*, p. 146.
S. flavescens *var.* thessalonica, *Boiss., Fl. Orient., suppl.*, p. 106.

Geogr. limits.—*N.* Mt. Chortiasch, above the city of Salonica, in Rumelia.
E. Island of Thasos, off the coast of Rumelia.
S. and *W.* Mt. Hagion Stephanos, in Thessaly, Greece, 1885 (*Haussknecht, in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 48).

179. SILENE MACRONYCHIA, *Boiss.*, *Fl. Orient.*, *suppl.*, p. 100.

Glanduloso-pubescens. Caules semel vel bis dichotomi, erecti, foliosi, pauciflori. Folia inferiora, oblonga, acuta, basi breviter attenuata, intermedia ovata; bractæ a basi sessili rotundata oblongo-lanceolatæ acuminatæ. Pedunculi calyci subæquilongi (illi florum alarium longiores). Calyx papillari-hispidulus, striis pallide virentibus, dentibus lanceolato-subulatis, fructifer sub capsulâ subconstrictus. Petala alba, bipartita, lobis lineari-oblongis, unguibus exsertis glabris, appendicibus triangularibus, elongatis. Capsula oblonga, carpophorum 4-plo superans.

Præcedenti valde affinis.

Hab. Between the villages of Pewar and Alikhel, in the Kurram Valley, Afghanistan.

180. S. YEMENSIS, *Deflers*, *Voy. au Yemen*, p. 112 (1889).

Cæspitosa, velutino-canescens, viscidula. Caules erecti simplices vel dichotomi in racemum terminalem strictum unilateralem 3–5-florum abeuntes. Folia pubescentia, ciliata, inferiora conferta, longe petiolata, sæpius acuminata, caulina pauca, parva, sessilia, lineari-lanceolata. Pedicelli erecti, bracteas vix superantes, apice subincrassati, $= \frac{1}{4}$ calycis tubum. Calyx tubulosus, glandulosus, albidus, fructifer clavatus hirsutiusculus, nervis paullo prominentibus, purpureis, viridi-marginatis, dentibus ovato-lanceolatis, obtusis. Petala pallide rosea, bifida, unguibus glabris, appendicibus parvis binis, linearibus, obtusis. Capsula ovata, carpophorum subæquans.

Hab. Yemen, in S.-W. Arabia.

181. S. JAPONICA, *Rohrb. in Linnæa*, xxxvi. (1870) p. 689.

Caulis pilis brevissimis hirsutiusculus, superne glaber. Folia coriacea, patentia, lineari-lanceolata, longe acuminata, carinata, punctulato-scabrida. Flores bini, terminales, ut videtur, racemum pauciflorum formantes; bracteæ parvæ lineares recurvæ. Calyx albido-viridis, tubuloso-clavatus basi truncatus, striis viridibus per totam longitudinem reticuloso-venosus, dentibus lanceolatis recurvis, anguste albo-marginatis. Petala saturate purpurea, unguibus calycem æquantibus glabris, laminâ obovatâ bifidâ, lobis ovatis obtusis, appendicibus binis fornicatis ovatis.

A species founded by Rohrbach on a single fragmentary specimen, and for the present doubtfully and tentatively placed in this group: in its collective characters appears to be distinct from other species.

Hab. Prov. of Ouari, in the island of Nippon, Japan.

Series 5. *Brachyanthæ.*

Species montanæ inflorescentiâ dichasiiformi valde compositâ; calyx vel obconicus vel breviter clavatus, et tum hyalinus.

a. Calyx obconicus.

182. SILENE RUPESTRIS, *Linn., Sp. Plant.*, ed. II. (1762) p. 602; *Reichb., Ic. Fl. Germ. Helv.*, n. 5091; *Rohrb., Monogr.*, p. 147.
Adde syn. S. alpestris, *Willd.* (*ex Nym., Consp.*, p. 92).

The character of the seeds varies in different descriptions.

Geogr. limits.—*N.* Lapland.
S. Sierra Nevada, in Andalusia.
E. Werchoturie, in N. Siberia, 60°.
W. Mtns. of Asturias, in N. Spain.

183. S. MENZIESII, *Hook., Fl. Amer. Bor.*, i. p. 90, t. 30 (1833); *Kellogg, in Proc. Calif. Acad.*, iii. p. 44, f. 12 (S. Dorrii); *Rohrb., Monogr.*, p. 147.

Adde: Caules foliosi. Petala non semper ecoronata.

Hab. The mountains of N.-W. America from Oregon Territory; Vancouver's Island, the Rocky Mountains, and the Black Hills as far as Slave Lake; and in the United States from Vancouver's Island to Colorado, South California and New Mexico.

184. S. CRYPTOPETALA, *Hilleb., Fl. Hawaiian Isl.*, p. 29 (1888).
Caules proceri decumbentes ramosi. Folia lineari-lanceolata uninervia sensim breviter petiolata glabra apice atque basi acuta; bracteæ cum prophyllis foliis conformes. Cymæ axillares subpaniculatæ, omni inflorescentiâ paniculam longam thyrsoideam formante. Calyx clavatus viscoso-puberulus breviter dentatus, ore contracto. Corolla staminaque intra calycem inclusa. Petala pallida obovato-oblonga minuta emarginata ecoronata. Antheræ ovoideæ obtusæ basi bifidæ. Capsula coriacea, ovoidea carpophorum æquans vel ab eo paullum superata. Semina reniformia tuberculato-aculeata.

The characters supplementary to those given in the original description are based upon the examination of authentic specimens.

Hab. Hawaiian Islands.

b. Calyx hyalinus, breviter clavatus basi truncatus.

185. SILENE TATARINOWII, *Regel, in Bull. Soc. Nat. Mosc.* (1861) p. 563; *Rohrb., Monogr.*, p. 131, n. 99, *et in Linnæa*, xxxvi. (1870) p. 681.

Caules laxi, 30–60 centim. longi, procumbentes vel adscendentes, superne laxe et divaricatim ramosi, pilis minutis retrorsis puberulo-hirsuti. Folia e basi ovatâ oblongo-lanceolata, attenuato-acuminata, brevissime petiolata, hirtello-puberula. Flores in dichasio laxo plus minus composito, calyce paullum brevius pedicellati, ramis florigeris e foliorum inferiorum axillis sæpe accedentibus; bracteæ herbaceæ, superiores minutæ ovato-vel lineari-lanceolatæ longe acuminatæ, dense puberulæ. Calyx nervis viridibus superne vix anastomosantibus, dentibus lanceolatis, acutis, ciliatis. Petala rubella, unguibus longe exsertis, laminâ obovatâ bifidâ, lobis oblongis, obtusis interdum emarginatis, utrinque lacinulâ parvâ obtusiusculâ auctis, appendicibus binis oblongis. Capsula oblonga, carpophorum subæquans. Semina dorso convexa, faciebus plana obtuse granulata.

Syn. Silene n. sp., *Maxim., Prim. Fl. Amur., suppl.*, p. 469.

Rohrbach based the position of this species in his monograph only upon Regel's description, but after he had examined the original specimens collected by Tatarinoff subsequently to the publication of his monograph, he rightly considered that the species should be transferred to this group, and should follow n. 131, where it is now placed in this revision. He says:—"Species, quum generis monographiam scripserim, mihi nisi ex cl. Regelii descriptione ignota. Itaque auctorem illum, qui speciem sinensem *S. Schafta* affinem esse dicat, secutus sum eamque, quum ex descriptione citata petalorum ungues auriculatos esse putarem inter *Auriculatas* enumeravi. Nunc autem speciminibus originalibus comparatis, ex inflorescentia composita calycisque forma naturalius mihi esse videtur, eam ad *Brachyanthas* numerare, inter quas juxta *S. Lerchenfeldianam* inserenda est."

Hab. North China; prov. of Pe-chi-li, near Peking (*Bretschneider*), Jehol (*David*).

186. S. MACEDONICA, *Formanek, in Verh., Naturf. Ver. Brünn*, xxxii. (1893) p. 183 [1894].

Caules florigeri e foliorum rosulæ terminalis basi lateraliter adscendentes, debiles, simplices vel apice ramosi. Folia glaucescentia, velutino-pubescentia vel glabra, margine interdum breviter ciliolata, inferiora oblongo-spathulata in petiolum longum attenuata, obtusa, rosulata, media ovato-oblonga, superiora lanceolata basi connata; bracteæ lineares. Flores 3–4 axillares, ceteri cymam terminalem corymbosam 2–5 (speciminibus pygmæis etiam unam)—floram formantes, breviter pedicellati. Calyx glaber, dentibus ovatis, obtusis. Petala alba, lanceolata-cuneata, obtusa. Capsula ovata, carpophoro duplo longior. Semina reniformia, tuberculata, dorso profunde canaliculata, faciebus concava.

Ab hâc *S. Lerchenfeldiana* imprimis differt floribus roseis densius dispositis, petalis emarginatis, et capsulâ carpophoro duplo longiore.

Hab. Bulgaria.

187. SILENE LERCHENFELDIANA, *Baumg., Enum. Stirp. Transsilv.*, i. p. 398 (1836); *Reichb., Ic. Fl. Germ. Helv.*, n. 5091; *Rohrb., Monogr.*, p. 148.

Syn. S. rupestris (non *Linn.*), *Schur, Enum. Pl. Transsilv.*, p. 105.

Geogr. limits.—*N.* Near Kronstadt, in the Transylvanian Alps (S. rupestris, *Schur*).
S. Mt. Chortiasch, near Salonica, in Rumelia.
E. Mt. Rhodope, near Carlova, in Eastern Rumelia (S. Bulgaria).
W. Mt. Kasovati, near Gergussowatz, in Servia.

Series 6. *Compactæ.*

Species annuæ, biennes, vel perennes. Flores in dichasio plus minus denso contracto capituliformi, brevissime pedicellati: calyx membranaceus glaber, nervis apice bifurcatim conjunctis; petala integra vel emarginata.

188. S. ARMERIA, *Linn., Sp. Plant.*, ed. I. p. 420; *Syme, Engl. Botany*, ed. III. ii. p. 61, t. 204; *Rohrb., Monogr.*, p. 149.

Differt a sequente, cui valde affinis, radice annuâ nec bienni; bracteis linearibus margine tantum scariosis; dichasio minus contracto; calyce paullum breviore, dentibus rotundatis non ciliatis; carpophoro interdum breviore; seminum dorso angustiore. Hæc planta occidentalis, orientalis illa.

Adde syn. S. latifolia, *S. F. Gray, Nat. Arr. Brit. Pl.*, ii. p. 647.

A species distributed throughout Central and Southern Europe; introduced in India, North America, Brazil, and probably elsewhere. The geographical area is not so wide as the references in many floras would seem

to justify, for the records in many localities are only such as would indicate it as an escape from gardens, where it is generally in cultivation, or in a state of semi-cultivation, and otherwise imperfectly naturalized. In England it is found occasionally by river-sides, in cornfields, and in waste places, but apparently only where it has escaped from gardens; and does not seem to be permanently naturalized. The pretensions of this species to a place in the British flora seem very slight. Dr. Richardson informed Dillenius that it grew on the banks of the River Dee half a mile below the city of Chester, but no one has confirmed his account. In the appendix to Hooker's 'Student's Flora,' it is mentioned among the excluded species as a casual. Similarly in Belgium, Denmark, and Sweden, it occurs subspontaneously. In the United States it is occasionally found on roadsides and in fields, having escaped from gardens; it has also been introduced into India and Brazil. In various localities in the northern provinces of Spain it is an uncertain denizen. The specimens found in Luxemburg appear to be naturally wild, as certainly the plant occurs under natural conditions in the neighbouring Prussian province of Rhine-land.

Geogr. limits.—*N.* Valley of the Moselle, in Rhenish Prussia.
S. Sicily.
E. Prov. of Koursk, in Russia (*ex Nym., Consp. Fl. Eur., suppl.*).
W. Portugal.

189. SILENE COMPACTA, *Fisch., Hort. Gorenk.*, ed. II. (1812) p. 60; et in *Hornem., Hort. Hafn.*, i. (1813) p. 417; *Reichb., Ic. Fl. Germ. Helv.*, n. 5093; *Rohrb., Monogr.*, p. 149.

Differt ab antecedente imprimis inflorescentiâ magis compactâ, floribus longioribus, petalorum laminâ integrâ, radice bienni.

Geogr. limits.—*N.* Prov. of Podolia, in W. Russia.
S. Amanus, N. Syria.
E. In the Djimil Valley, Turkish Lazistan.
W. The Banat, in Hungary.

190. S. REUTERIANA, *Boiss. et Blanche, Diagn. Pl. Nov. Or.*, Ser. II. v. p. 54; *Rohrb., Monogr.*, p. 150.

Ab antecedente caule tenuiori, ramis lateralibus elongatis, foliis angustioribus, rameis brevissimis, floribus sparsis, petalis bilobis, distincta.

Hab. Syria.

191. S. ASTERIAS, *Griseb., Spicil. Fl. Bith. Rumel.*, i. p. 168; *Rouy, Illustr. Pl. Eur. Rar.*, fasc. i. (1895) n. 4; *Rohrb., Monogr.*, p. 150.

Geogr. limits.—*N.* Mt. Kopaonik, near Kruschewatz, in Servia.
S. and *E.* Petrov Han, in the Balkans, N. Bulgaria, *Velenovsky* (1887).
W. Herzegovina (*ex Nym.*, *Consp. Fl. Eur.*, p. 89).

B. Species annuæ.

a. Inflorescentiæ rami valde inæquales, altero in florem unum reducto, ita ut flores in foliorum axillis geminati esse videantur; interdum inflorescentia superne scorpioidea.

Series 7. *Nicæenses.*

a. Calyx fructifer apice contractus.

192. SILENE RAMOSISSIMA, *Desf.*, *Fl. Atlant.*, i. (1798) p. 354; *Willk.*, *Ic. Descr. Pl. Nov. Hisp.*, i. p. 54, t. 39 A; *Rohrb.*, *Monogr.*, p. 151.

β. GRAVEOLENS, *Duf.* (sp.) *in Bull. Soc. Bot. France*, vii. (1860) p. 242.

Flores longe pedunculati, axillaribus solitariis erectis, valde odorati, vespertini. Calycis dentes basi membranâ conjuncti. Petala rosea nec alba, lineari-bipartita.

Desfontaines erroneously marked his plant as perennial, and this misled Dufour into describing *S. graveolens* as a distinct species.

Geogr. limits.—*N.* Near Salon, } in Catalonia, Spain.
E. Near Tarragona, } in Catalonia, Spain.
S. Near Oran, in Algeria.
W. Morocco.

193. S. CINEREA, *Desf.*, *Fl. Atlant.*, i. (1798) p. 355; *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 138, t. 89.

Adde: Caulis 30–60-centim. longus, virgatus, superne vel a medio dichotome ramosus, sæpe fere a basi ramos axillares cauli conformes emittens, sub lente crebre punctiformi-puberulus pilis eglandulosis. Bractæ herbaceæ. Calyx fructifer superne clavatus infra capsulam angustatus. Capsula carpophoro pubescente paullum longior. Semina compressa, faciebus profunde auriculiformi-excavata, dorso plana granulata.

Rohrbach had not seen the plant, but trusting apparently to Soyer-Willemet's description, placed it after *S. Kremeri*: as the fructiferous calyx is contracted at the mouth, it should come after *S. ramosissima*.

Hab. Algeria.

b. Calyx fructifer apice non contractus.

194. SILENE KREMERI, *Soy.-Will. et Godr., Sil. Alg.*, p. 31; *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 140, t. 90; *Rohrb., Monogr.*, p. 151.

Adde: Caulis 10–60-centim. longus, virgatus, superne vel a medio dichotome ramosus. Folia inferiora obtusa, superiora obtusa, vel sæpe acuta. Bracteæ herbaceæ, longe ciliatæ. Petala albida, ochrolenca, unguibus ciliatis. Capsula carpophoro pubescente paullum brevior. Semina compressa, faciebus auriculiformi-subconcava, dorso obtuse canaliculata tuberculata.

Hæc species habitu *S. cinereæ* affinis, sed distincta calyce fructifero superne ovato- vel subgloboso-clavato infra capsulam constricto, petalorum unguibus dorso glabris, marginibus ciliatis, filamentis in parte inferiore pubescenti-ciliatis, carpophori longitudine, seminibus faciebus subconcavis dorso canaliculatis.

As in the previous species, Rohrbach did not examine any specimens, but relied on Soyer-Willemet's description, to which are here added other characters given by Cosson in his account of the plant.

Hab. Algeria.

195. S. CIRTENSIS, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 328.

Caulis erectus, robustus, e basi ramosus, ramulis strictis, brevissime pubescens. Folia glauca, obovata vel oblonga, superiora sublinearia, omnia puberula, ciliata. Flores breviter pedunculati. Calyx tubulosus, fructifer ovoideo-oblongus infra capsulam constrictus, nervis pilis articulatis vestitis, superne reticulato-venosus, dentibus obtusis oblongis. Petala bifida, unguibus ciliatis, appendicibus brevibus bilobis. Filamenta glabra. Capsula oblongo-ovoidea carpophorum quater superans. Semina brunea, faciebus excavata striata.

Hab. Environs of Constantine, Algeria.

196. S. NICÆENSIS, *All., Misc. Taurin.*, v. p. 88; *Fl. Pedem.*, ii. (1785) p. 81, t. 44; *Rohrb., Monogr.*, p. 152.

Adde syn. S. Vallesiaca, *Link., Handb.*, ii. p. 244.

A biennial species, according to E. Tanfani.

Geogr. limits.—*S.* and *E.* Cyprus.
N. Island of Lido, near Venice (*Kellner, ex Tanfani, in Parl., Fl. Italiana*, ix. p. 394 [1892]).

b. Flores in dichasio composito regulari, ramis æqualibus vel raro paullum inæqualibus.

Series 8. *Atocia.*

Calyx fructifer apice non contractus. Semina faciebus curvato-excavata, vel subglobosa profunde umbilicata.

a. Semina faciebus curvato-excavata (concaviuscula).

α. Semina dorso, tuberculorum seriebus 3 ornato, plano-convexa medio leviter canaliculata.

197. Silene fuscata, *Link, ap. Brot., Fl. Lusit.*, ii. (1804) p. 187; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 65, t. 48 a; *Rohrb., Monogr.*, p. 153.

Geogr. limits.—*N.* Liguria; the Gulf of Genoa.
E. Beyrout, in Syria.
S. Algeria.
W. Near Lisbon.

198. S. Pseudo-Atocion, *Desf., Fl. Atlant.*, i. (1798) p. 353; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 66, t. 49; *Rohrb., Monogr.*, p. 154.

Valde affinis *S. fuscatæ*, a quâ differt caule e basi ramoso; floribus non appropinquatis; calyce longiore haud umbilicato, nervis reticulato-venosis, commissuris glabris, dentibus acutis; carpophoro pubescente multo longiore; seminibus paullum majoribus.

β. oranensis, *Battand., Fl. de l'Algérie*, p. 138 (1888).

Petala maxima obovato-cuneata subemarginata. Capsula carpophorum subæquans.

Hab. Majorca, in the Balearic Isles, and Algeria; also near Jerez, in Andalusia, *Perez Lara* (1886).

β. Semina dorso obtuse canaliculata.

† Calyx evenius.

199. S. divaricata, *Clem., Elench. Hort. Madrit.* (1806), p. 103; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. p. 50, t. 35; *Rohrb., Monogr.*, p. 154.

Habitu hæc valde accedit ad *S. sedoidem*, a quâ differt omnium partium magnitudine; pubescentiæ modo; calycis evenii dentibus lanceolatis acutis seminum formâ diversissimâ.

β. WILLKOMMIANA, *J. Gay* (sp.), *ap. Coss., Not. Pl. Crit.*, ii. (1850) p. 32; *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 660.

Robustior, ramosissima, dense hirsuta, valde viscosa, foliis carnosulis, corolla pallida.

Geogr. limits.—*N.* Sierra de Carascoy, near Murcia.
S. Dschebel Santo (Sacred Mountain), in Algeria.
E. Dschemma Ghazawat, in Algeria.
W. Andalusia, near Malaga.

200. SILENE RUBELLA, *Brot., Fl. Lusit.*, ii. (1804) p. 188; *Willk., Ic. Descr. Pl. Nov. Hisp.*, p. 66, t. 48 B; *Rohrb., Monogr.*, p. 155.

Differt a *S. fuscatâ*, cui habitu valde accedit, calyce haud umbilicato, scabride nec viscoso-pubescente, dentibus rotundatis; carpophoro multo breviore; seminum formâ; a ceteris magis distat.

The Linnean description is loosely worded, and does not sufficiently identify the plant, which is described from Portuguese specimens. It is as follows:—" Radix annua. Caulis erectus, rectus, vix pedalis, non ramosus. Folia inferiora cuneiformia obtusa, superiora lanceolata; articulus supremus caulis longior. Flores conferti caulem terminant, dichotomi, 3 vel 7. Calyces glabri, cæsii, subglobosi, venosi. Corollæ rubræ, bifidæ, nectariferæ, vix unquam apertæ, minutissimæ et vix conspicuæ."

Adde syn. S. antirrhina, *Otth, in DC. Prodr.*, i. p. 378 (non *Linn.*).

Geogr. limits.—*N.* Monserrat, in Catalonia.
S. Upper Egypt.
E. Near Bagdad, in Asiatic Turkey.
W. Near Lisbon.

201. S. BERGIANA, *Lindm. in Act. Hort. Berg.*, i. (1891) p. 3, n. 6, f. 1–8.

Caulis erectus simplex vel rarius e basi ramosus, pilis recurvis scabride puberulus. Folia inferiora ovato-spathulata ad basin attenuato-petiolata, obtusissima, superiora oblongo-lanceolata, acuta, basi angustata, omnia ciliata; bracteæ et prophylla undulatæ late lineares, acuminatæ, ciliatæ, puberulæ. Dichasium remotiflorum; pedicelli fructiferi calycem usque 3-plo superantes. Calyx pallide virens 9 mm. long. obovato-cylindraceus, fructifer obovato-turbinatus, basi attenuatus, haud umbilicatus, puberulus, dentibus subtriangulari-rotundatis albido-marginatis lanuginoso-ciliatis, nervis latis viridibus.

Petala pallide rosea, bifida, unguibus superne paullum connatis, laminâ minutâ obcordatâ, appendicibus binis parvis leviter emarginatis, non in tubum connatis. Capsula ovoidea carpophorum 3–4-plo superans.

Syn. S. rubella, *Hort. Olyssiponensis.*

Hab. Portugal.

202. SILENE TURBINATA, *Guss.*, *Fl. Siculæ Prodr.*, i. (1827) p. 506; *Moris*, *Fl. Sardoa*, i. (1837) p. 249, t. 14 (S. rubella *var.* brachypetala).

Caulis erectus, simplex vel e basi ramosus, glaber. Folia radicalia lanceolato-spathulata, obtusa, media lanceolata acuta, superiora linearia acuminata, omnia margine scabra, uninervia. Flores laxe paniculato-fasciculati, breviter pedicellati. Calyx albidus clavatus basi in petiolum attenuatus, fructifer turbinatus, dentibus rotundatis obtusis, late albo-marginatis, ciliatis. Petala rosea bifida, unguibus inclusis, laminâ minimâ obcordatâ, lobis obovato-linearibus, appendicibus bilobis, inter se connatis. Capsula ovata carpophorum ter superans.

A *S. rubellâ* certissime diversa.

Hab. Sardinia and Sicily.

203. S. SEGETALIS, *Duf. in Bull. Soc. Bot. France*, vii. (1860) p. 241.

Caulis erectus, dichotome ramosus, pruinoso-pubescens. Folia ovato-oblonga, omnia margine undulata, ad basin attenuata, ciliata. Flores erecti. Calyx purpurascens glaber, breviter tubulosus, fructifer turbinato-clavatus, dentibus ovatis, obtusis, late albo-marginatis, lanuginoso-ciliatis. Petala emarginata rosea, appendicibus oblongis, bilobis, inter se connatis. Capsula ovato-oblonga, carpophorum bis terve superans.

Syn. S. patula, *Lag. ex Duf.*, *l.c.*, p. 242 (non *Desf.*).
S. rubella, *Soy.-Will. et Godr.*, *Sil. d'Algér.*, p. 37 (non *Linn. ?*)
S. undulata, *Pourr. in Herb. Salvad.*, n. 109 (non Ait.), *fide Rohrb.*, *Monogr.*, p. 155.
S. stricta, *Achar. in Herb. Holm.* (non *Linn.*), *fide Lindm.*

Geogr. limits.—*N.* Tudela, in Navarre.
E. Tunis.
S. Algeria.
W. Near Cadiz, in Andalusia.

†† Calyx nervis anastomosantibus.

204. SILENE ARGILLOSA, *Munby, in Bull. Soc. Bot. France*, xi. (1864) p. 44; *Coss., Ilustr. Fl. Atlant.*, fasc. iv. (1890) p. 141, t. 91.

Pubescenti-glandulosa. Caules 14–40 centim. longi, erecti, superne dichotomi, plures vel solitarii, pilis inferioribus, crispulis longioribus, superioribus brevibus. Folia haud undulata, margine ciliato-scabra; inferiora obovato-oblonga vel oblonga obtusa, inferne attenuata; superiora lanceolata, acuta, inferne haud attenuata; bracteæ herbaceæ, pedicellis breviores. Flores erecti, longissime pedicellati, dichotomiis plus minus divergentibus. Calyx oblongo-tubulosus, basi umbilicatus, pallide virescens vel rubescens, fructifer superne cylindraceus infra capsulam angustatus, nervis viridibus, dentibus ovato-triangularibus subacutis, albo-marginatis, lanuginoso-ciliatis. Petala rosea, unguibus parum exsertis, laminâ integrâ oblongo-cuneatâ, appendicibus oblongis integris et omnibus ad coronam superne crenulatam adnatis. Filamenta glabra. Capsula ovato-cylindrica carpophoro subtriplo longior. Semina reniformia, compresso-subglobosa, dorso lato tuberculorum seriebus tribus ornato.

Habitu notisque plurimis affinis *S. fuscatæ*, sed differt dentibus calycinis subacutis non obtusiusculis, petalis ad faucem lamellâ integrâ non emarginato-bilobâ donatis, capsulâ ovato-cylindraceâ, carpophoro brevi.

By Rohrbach joined with *S. rubella*, but is essentially distinct, as Cosson shows.

Hab. Prov. of Oran, in Algeria.

b. Semina subglobosa tuberculata profunde umbilicata. Calyx nervis anastomosantibus.

205. S. ÆGYPTIACA, *Linn. f., Suppl. Plant.*, p. 241; *Linn., Sp. Plant*, ed. I. p. 415 (Cucubalus); *Jacq., Hort. Vindob.*, iii. (1776) p. 19, t. 32 (S. Atocion); *Rohrb., Monogr.*, p. 156.

Adde syn. S. atocia, *St. Lag. in Ann. Soc. Bot. Lyon*, vii. (1880) p. 134.

S. retroflexa, *Steud., Nomencl. Bot.*, ed I. p. 780; ed. II. p. 587.

Geogr. limits.—*N.* Cilicia, in Asia Minor.
E. Prov. of Aleppo.
S. Egypt, near Alexandria.
W. Algeria, near Tiaret.

206. SILENE VIRESCENS, *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 143, t. 92.

Caules 15–30-centim. longi, erecti, ad medium vel superne dichotomi, glanduloso-pubescentes. Folia haud undulata, pilis bulbosis conspersa, margine ciliata; inferiora obovata vel ovato-oblonga obtusa inferne in petiolum attenuata; caulina ovato-oblonga; bracteæ pedicellis subduplo breviores. Flores longissime pedicellati, pedicellis post anthesin patentibus, dichotomiis divergentibus vel divaricatis. Calyx pallide virescens, oblongo-tubulosus, basi umbilicatus, fructifer cylindraceo-dilatatus, apice haud contractus infra capsulam angustatus, dentibus triangularibus, acutis, albo-marginatis ciliatis. Petala purpurascentia, unguibus exsertis, laminâ minutâ oblongo-cuneatâ emarginatâ, appendicibus bipartitis minutis acutis. Filamenta glabra. Capsula cylindracea subsessilis carpophorum multies superans. Semina reniformia.

Ab eâ *S. divaricata* differt villositate omnium partium multò longiore, foliis angustioribus plerisque lanceolatis, acutis, calyce in nervis anastomosantibus longe hirsuto, fructifero superne oblongo, inferne attenuato, petalorum lamellâ elongatâ in lobos lineares acutos bipartitâ, capsulâ demúm calycem excedente, superne paullulum attenuatâ, seminibus striatis latius depressis et dorso obtuse canaliculatis.

Hab. S.W. Morocco.

207. S. ATOCIOIDES, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. v. p. 83; *Rohrb.*, *Monogr.*, p. 156.

Ad *S. ægyptiacam* valde affinis, a quâ differt bracteis herbaceis, foliis minoribus acutioribus, capsulâ breviore, et præsertim seminum formâ et magnitudine.

Hab. S. Anatolia.

208. S. MEKINENSIS, *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 144, t. 93.

Pubescenti-glandulosa. Caules erecti vel diffuso-adscendentes, dichotome ramosi. Folia haud undulata, pilis basi bulboso-incrassatis conspersa, margine ciliata; inferiora obovata vel obovato-oblonga, obtusa, in petiolum brevem attenuata; caulina ovata vel ovato-oblonga, obtusa rarius acuta. Bracteæ pedicellis breviores. Flores longe pedicellati, dichotomiæ ramis divergentibus, ramo altero dichotomiarum interdum abortu unifloro vel deficiente. Calyx albido-virescens vel rubescens oblongo-tubulosus, umbilicatus, fructifer dilatatus, oblongus, superne attenuatus, infra capsulam angustatus, nervis pilis patentibus vestitis, dentibus ovato-triangularibus rotundatis albo-marginatis, longe ciliatis. Petala purpurascentia, unguibus exsertis, laminâ oblongo-cuneatâ, emarginatâ, appendicibus binis elongatis lineari-lanceolatis, acutis, inter se liberis. Filamenta glabra. Capsula ovato-oblonga sub-sessilis carpophoro 4–5-plo longior.

S. virescenti villositate brevi magis proxima, sed distincta calyce fructifero oblongo superne attenuato, non cylindraceo, petalis multo majoribus, appendicibus binis lineari-lanceolatis, capsulâ ovato-oblongâ superne attenuatâ.

Hab. Djebel Sadig, near Mekinez, in Morocco.

209. SILENE DELICATULA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 41; *Rohrb.*, *Monogr.*, p. 157.

Hab. Cilicia, in Asia Minor.

210. S. INSULARIS, *Barbey, in Bull. Soc. Vaud. Sc. Nat.* (1885), p. 220; *Boiss.*, *Fl. Orient.*, *suppl.*, p. 95.

Breviter et crispule pubescenti-viscida, obscure virens. Caules plures ascendenti-prostrati fragillimi 2–5-flori. Folia minima, ovato-oblonga, obtusa, infima brevissime petiolata, suprema sessilia, elliptica, acuta. Flores ob dichotomiæ ramum alterum abortivum solitarii, pedunculo filiformi eis 2–3-plo longiore suffulti. Calyx florifer tubulosus, fructifer ovato-oblongus, dentibus oblongis obtusis. Petala rosea, unguibus paullulum exsertis, laminâ oblongâ. Capsula ovata carpophoro 6-plo longior. Semina muriculata, dorso plano-convexiuscula, faciebus plana.

Affinis præcedenti, caulibus elongatis erectis valde dichotomis, foliis acutis, calyce longiore obconico, capsulâ carpophoro tantum duplo longiore, seminibus muriculatis, ab hâcce distincta. Facies *S. sedoidis.*

Hab. Mt. Kalolamni, in the island of Scarpanto, in the Turkish Archipelago.

Series 9. *Rigidulæ.*

Calyx fructifer apice non contractus. Semina faciebus plana.

A. Semina dorso utrinque alâ undulatâ ornato canaliculata.

211. S. NANA, *Kar. et Kir. in Bull. Soc. Nat. Mosc.*, XV. (1842) p. 169; *Rohrb.*, *Monogr.*, p. 157.

S. clandestinæ quadammodo ex habitu similis, pluribus notis autem diversissima,—petalis integris, calyce fructifero ampliato, foliis acuminatis, glabris, margine pilis raris ciliatis nec scabris, seminibus alâ undulatâ marginatis.

By Ledebour ('Fl. Rossica,' i. p. 777, in suppl.) placed in the group *Elisanthe*, which is now a section of the genus *Melandryum*. From an examination of the capsules of dried specimens in Herb. Kew, I am inclined to agree with this view, as I was unable to detect the remains of septa at the base of the capsules I examined; but I should prefer not to be responsible for excluding the species from *Silene* unless I had the opportunity of examining the fresh capsules of living plants. Boissier (*Fl. Orient.*, i. p. 581) has "capsula basi trilocularis," though the statement seems based only on presumptive evidence.

Geogr. limits.—*N.* Agathme, in Turkestan.
S. Beluchistan.
E. The spring of Sassyk-pastan, in the Desert of Soungaria.
W. Kerman, in S.E. Persia.

B. Semina dorso plana.

a. Capsula carpophorum bis superans.

212. SILENE HUSSONI, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 76; *Rohrb.*, *Monogr.*, p. 158.

Hab. Wadi Sannour, in the Egypto-Arabian Desert.

b. Capsula carpophorum equans vel paullum superans.

213. S. RIGIDULA, *Sibth. et Sm.*, *Prodr. Fl. Græc.*, i. p. 299; *Fl. Græca*, v. p. 21, t. 430; *Rohrb.*, *Monogr.*, p. 158.

Adde syn. S. methanæa, *Heldr. Exs. Herb. Norm.*, n. 828.

Haussknecht is disposed to consider this species as merely a form of *S. portensis*, in which the capsule and carpophore are nearly of the same length: there is no difference in the seeds of the two plants.

Geogr. limits.—*N.* Mt. Hymettus, near Athens.
E. Island of Rhodes.
W. Mt. Malevo, in the Morea.
S. Island of Crete.

214. S. ECHINOSPERMA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 78; *Rohrb. Monogr.*, p. 158.

Differt a priori, cui valde affinis, præsertim colore petalorum et seminibus.

Hab. Mt. Taygetus, in the nome of Messenia, Greece.

215. SILENE JUNCEA, *Sibth. et Sm.*, *Prodr. Fl. Græc.*, i. p. 297 (1806); *Fl. Græca*, v. p. 15, t. 421; *Sweet, Brit. Flow. Gard.*, i. t. 92 (S. picta); *Rohrb.*, *Monogr.*, p. 159 (S. picta).

A prioribus, floribus brevissime pedicellatis jam primo aspectu distingui potest.

Adde syn. S. reticulata, *Link*, *Enum. Hort. Berol.*, i. p. 426 (*non Desf.*).

β. PALLIDA, *Boiss.*, *Fl. Orient.*, i. p. 605.

Pallide virens. Rami strictiores. Calycis nervi pallidiores. Petalorum lobi angustiores acutiores, nervis paucis non anastomosantibus.

Syn. S. syriaca, *Reut. in Cat. Hort. Genev.* (1857), p. 4.
S. filiformis, *Ehrenb. Herb.*, *an Otth, in DC. Prodr.*, i. p. 376?

To avoid confusion of names and dates, it is best to follow Boissier in the name for this species in place of *S. picta*, Pers. (1805). Persoon identifies with his plant *S. bicolor*, Thore, which is certainly a synonym of *S. portensis* (the next species), but Rohrbach seems to infer that Persoon's brief diagnosis of *S. picta* does not accurately describe authentic specimens of *S. picta*, Thore, and while admitting the latter as a synonym of *S. portensis*, credits Persoon with a new species with Thore's name tacked on to it. This subordination of the law of common sense to the law of priority only tends to bring the latter more into disrepute than it already is. Inaccuracy and ambiguity in Persoon's brief description is much more likely than actual differences in the authentic specimens. Compare also *S. picta*, Desf., Cat. Hort. Paris, ed. I. p. 159 (1804), which Rohrbach refers also to the next species; also *S. picta*, DC., Pl. Rar. Hort. Genev.

Geogr. limits.—*N.* and *W.* Island of Rhodes (*Bourgeau*, 1888).
S. Sidon, in Syria.
E. Baalbec, in the Lebanon (*var. β*).

c. Capsula carpophoro bis terve superata.

216. S. PORTENSIS, *Linn.*, *Sp. Plant*, ed. I. p. 420; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5074; *Rohrb.*, *Monogr.*, p. 159.

Geogr. limits.—*N.* Liguria, in Italy (*Tanfani, in Parl. Fl. Italiana*, ix.).
S. Andalusia, in Spain.
E. Island of Negropont, in the Greek Archipelago.
W. Near Oporto, Portugal.

C. Semina dorso canaliculata.

a. Capsula carpophoro ter quaterve superata.

217. SILENE RETICULATA, *Desf.*, *Fl. Atlant.*, i. (1798) p. 350, t. 99; *Rohrb.*, *Monogr.*, p. 160.

Hab. Mt. Atlas, in Algeria.

b. Capsula carpophorum æquans.

α. Filamenta villoso-ciliata.

218. S. KOTSCHYI, *Boiss.*, *Diagn Pl. Nov. Or.*, Ser. I. i. p. 40.

Breviter pruinoso-pubescens, superne viscidula, viridis. Caulis gracilis superne dichotome ramosus, ramis filiformibus rigidis. Folia inferiora anguste lineari-lanceolata, mucronata, superiora linearia; bracteæ et prophylla setaceæ, acutæ, albomarginatæ ciliatæ. Flores mediani calyce multo longius pedicellati, flores laterales calyce brevius pedicellati. Calyx papilloso-hirtulus, tubuloso-clavatus, evenius, truncato-umbilicatus, fructifer oblongo-clavatus, infra capsulam leviter constrictus, dentibus lanceolatis acuminatis, ciliatis. Petala rosea, emarginato-bifida, cuneata, appendicibus binis rotundatis. Capsula ovato-oblonga.

β. MARITIMA, *Boiss.*, *Fl. Orient.*, i. p. 602.

7–10 centim. alt., humilior, internodia abbreviata.

Syn. S. microsperma, *Fenzl*, *Pugill. Plant. Nov. Syr.*, p. 9, n. 27.

γ. EXSUDANS, *Boiss. et Heldr.* (sp.), *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 76; *Fl. Orient.*, i. p. 602.

Inferne crispule puberula, superne viscidula, a basi divaricatim et dichotome ramosissima, pumila. Calyx viridi-vittatus. Capsula ovata.

Hab. Tchinova, and near Adalia, in Anatolia.

δ. EFFUSISSIMA, *Boiss.*, *Fl. Orient.*, *suppl.*, p. 95.

Caules 45-centim. longi, longe et tenuissime ramosissimi. Appendices corollæ acutiores, triangulares.

Hab. Mt. Avroman, prov. of Marasch, and Mt. Schahu, in Kurdistan.

ε. CASSIA, *Boiss.* (sp.), *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 78; *Rohrb. Monogr.*, p. 160.

Inferne papilloso-scabridula, superne glabra viscida. Caules e basi ramosi. Flores omnes calyce longius pedicellati. Petala alba, profundius bifida.

Hab. N. Syria; Mt. Cassius.

ζ. CORINTHIACA, *Boiss. et Heldr.* (sp.), *Boiss.*, *Fl. Orient.*, *suppl.*, p. 96.

Calyx glaber rubellus, dentibus ovatis, obtusis, alternis, mucronulatis. Petala albida.

Hab. Lutraki, on the Corinth Canal (*Heldreich*).

There is some ambiguity and confusion in Rohrbach's account of the various forms of this polymorphous species. The grouping of the varieties as given above is based upon my examination of the material at Kew.

Geogr. limits.—*N.* Prov. of Marasch, in Turkey in Asia (forma typica).
S. Mt. Lebanon (forma typica).
E. Mt. Schahu, in Kurdistan (*var.* δ).
W. Lutraki, on the Corinth Canal (*var.* ζ).

219. SILENE INTRICATA, *Post, in Post et Autran, in Bull. Herb. Boiss.*, iii. (Apr., 1895) p. 154.

Inferne et usque ad inflorescentiæ basin tenuissime papilloso-aspera, superne glabra viscida. Caules numerosi, erecti, effuse et intricatim paniculati, ramis filiformibus. Folia graminosa, linearia, plana, papilloso-scabridula, superiora decrescentia. Pedunculi calyce multo breviores. Calyx glaberrimus, evenius, rubro-lineatus, dentibus ovatis, obtusis. Petala viridia, cuneata, ultra medium bipartita, appendicibus binis minimis dentiformibus.

Species præcedentis var. *effusissimæ* affinis, differt foliis planis non complicatis, calyce glaberrimo rubro- (nec viridi-) lineato dentibus ovatis obtusis, petalis viridibus.

Hab. Mt. Gaiour-dagh, in prov. of Aleppo (n. 302).

β. Filamenta glabra.

220. S. CARIENSIS, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 40 (1842); *Rohrb.*, *Monogr.*, p. 161.

Adde: Caulis gracilis, superne dichotome ramosus. Lamina magna cuneato-obcordata, appendicibus linearibus, unguibus glabris. Species elegans facie *Eudianthes Cœli-rosæ*.

Hab. Anatolia.

221. SILENE INTEGRIPETALA, *Bory et Chaub.*, *Fl. Pelopon.*, p. 27, n. 687, t. 14 (1832); *Rohrb.*, *Monogr.*, p. 161.

Hab. Morea, in Greece.

222. S. LACONICA, *Boiss. et Orph.*, *Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 34; *Rohrb.*, *Monogr.*, p. 165.

S. pentelicæ affinis, sed differt præsertim floribus majoribus, petalis bilobis.

Hab. Mt. Malevo, in the nome of Laconia, Greece.

223. S. ARENOSA, *C. Koch, in Linnæa*, xv. (1841) p. 711; *Stschegl. in Bull. Soc. Nat. Mosc.* (1853), I. p. 322, t. 5 (S. Kowalewskyi); *Rohrb.*, *Monogr.*, p. 161.

S. linearis est planta major, foliis latioribus, calyce reticulato-venoso.

Geogr. limits.—*N.* Nakhtschewan, on the R. Aras, in Russian Armenia.
S. Lake of Nemeckdenja, in S. Persia.
E. Peshawur, in the Punjâb.
W. Ruins of Babylon, prov. of Bagdad.

224. S. LINEARIS, *Decne.*, *Fl. Sinaïc.*, *in Ann. Sc. Nat.*, Sér. II. iii. (1835) p. 276; *Rohrb.*, *Monogr.*, p. 162.

A. *S. Kotschyi* differt caule crassiore albido, foliis minus tenuibus, calycis dentibus margine membranaceis non ciliatis.

Geogr. area.—The Egypto-Arabian Desert.
N. Wadi Hebran, in Arabia Petræa.
S. Between Kosseir and Ras Benass, on the Egyptian coast of the Red Sea (*Schweinfurth*).
E. The peninsula of Mt. Sinai (*Schweinfurth*).
W. Bir Beda, near Suez.

c. Capsula carpophorum 2–4-plo superans.

a. Flores laterales calyce brevius pedicellati.

225. S. CHÆTODONTA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 39; *Rohrb.*, *Monogr.*, p. 162.

Facies *S. Muscipulæ*, sed calyx fructifer apice non contractus, nervis non anastomosantibus.

Adde syn. S. debilis, *Stapf, in Denkschr. Akad. Wien.*, li. (1886) 282.

β. PITTODES, *Boiss.*, *Fl. Orient.*, i. p. 606; *Rohrb.*, *Monogr.*, p. 162.

Varietas humilis viscosissima, ramis abbreviatis, floribus omnibus brevissime pedicellatis.

Geogr. limits.—*N.* Turkey in Asia; prov. of Orfah, near the R. Euphrates.
S. S. Persia.
E. N. Persia; Schahrud, in prov. of Khorassan.
W. Syria; near Beyrout.

226. SILENE STRIATA, *Rohrb. in Bot. Zeitung*, XXV. (1867) p. 83; *Monogr.*, p, 163.

Adde: Calyx anguste cylindricus inter costas elevatas sulcato-striatus, fructifer clavatus.

Facie et characteribus valde affinis formis pumilis *S. Kotschyi*, quâcum confusa fuerat et a quâ differt calyce glaberrimo, pedunculis crassioribus, appendicis corollæ formâ, filamentis glabris, et carpophori longitudine.

Hab. Near Baalbec, in the Lebanon.

β. Flores laterales calyce longius pedicellati.

† Petala e calyce exserta.

227. S. PINETORUM, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 75; *Raul., Île de Crète*, p. 600, t. 9; *Rohrb., Monogr.*, p. 164.

Differt a *S. pentelicâ* rigiditate, foliorum formâ, pedunculis longioribus, formâ capsulæ.

Hab. Crete.

228. S. SEDOIDES, *Poir., Voy. Barb.*, ii, p. 164; *Reichb., Ic. Fl. Germ. Helv.*, n. 5064 b; *Rohrb., Monogr.*, p. 164.

A priori differt calyce oblongo reticulato-venoso, capsulâ oblongâ carpophoro breviore, seminibus multo minoribus.

Adde syn. S. delicatula, *Bertol., Fl. Italica*, iv. p. 624.

S. sicula, *Cyr., ex Schrank, in Denkschr. Bot. Ges. Regensb.*, ii. (1822) p. 46.

β. LAXA, *Haussk. in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 51.

Caules elongati, subflaccidi, filiformes. Folia majora, tenuiora, pallide viridia, internodiis valde remotis. Petala, unguibus exsertis.

Hab. Vromolimni, in S. Greece.

γ. PACHYPHYLLA, *Haussk. in Nym. Consp. Fl. Eur., suppl.*, ii. p. 55 (1889) [nomen]; *Haussk. in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 51.

Caules crassiores, rigidi, dense glanduloso-viscosi, lateralibus sæpe prostratis, elongatis. Folia basilaria majora, obovato-spathulata, apice rotundata, omnia crassa, pilis longioribus obtecta, summa ovata. Inflorescentia divaricatim et laxe cymosa. Calyx obovoideo-clavatus, dentibus latioribus obtusioribus. Capsula carpophoro bis longior.

Hab. Near Athens.

Geogr. limits.—N. Istria, in Austria (*ex Nym., Consp. Fl. Eur.*).
S. and *E.* Near Sidon, in Syria.
W. Carthagena, in prov. of Murcia (*Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 661).

229. SILENE PENTELICA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 74; *Rohrb., Monogr.*, p. 164.

Tota patule et breviter hirsuta viscida. Caulis humilis e basi divaricatim ramosissimus. Folia radicalia oblongo-spathulata, obtusa, floralia sensim diminuta, oblongo-linearia. Inflorescentia divaricatim et laxe cymosa, nec superne subracemosa; pedicelli fructiferi erecti, florum dichotomialium calyce multo longiores. Calyx papillari-viscidus, obconico-ovatus, umbilicatus, nervis anastomosantibus, dentibus ovatis obtusis. Petala rosea, cuneata, retusa, appendicibus bipartitis, segmentis oblongis, unguibus longius exsertis. Capsula crustacea nec membranacea, oblonga, carpophorum ter superans. Semina transverse striata.

Affinis præcedenti, differt cymis regulariter dichotomis, pedunculis longioribus erectis, laminis longius exsertis.

Hab. Livadia; Mt. Pentelicus, between Athens and Marathon.

230. S. HAUSSKNECHTII, *Heldr., Pl. exsicc. in Itin. Græc.* (1885); *et in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 51.

Caulis humilis, e basi divaricatim ramosus, scabro-pubescens, glandulosus. Folia subcarnosa scabro-pubescentia, glandulosa, inferiora lanceolato-spathulata, obtusiuscula, ciliata, superiora elliptico-ovata, acutiuscula, brevissima, summa lanceolata, magis acuta. Calyx glanduloso-viscosus, clavato-cylindricus, umbilicatus, fructifer oblongo-clavatus, infra capsulam constrictus, nervis anastomosantibus, dentibus ovatis obtusis albomarginatis ciliatis. Petala rosea, laminâ ovato-rotundatâ, integrâ, venis obscurioribus percursâ, appendicibus bidentatis. Capsula carpophoro ter longior.

Affinis præcedenti, differt foliis latioribus minus obtusis, calyce angustiore, petalis integris, appendicibus bidentatis, etc.

Described from authentic specimens in Herb. Kew.

Hab. On the peak of Zygos of Mt. Pindus, above Metzovo, upon the frontier between Greece and the Turkish province of Epirus.

†† Petala tota in calyce inclusa sive nulla.

231. SILENE INAPERTA, *Linn.*, *Sp. Plant.*, ed. I. p. 419 (*non Linn. Herb.*, quæ = S. multicaulis, *Guss.*); *Dill.*, *Hort. Eltham.*, p. 424, t. 315, fig. 407; *Rohrb.*, *Monogr.*, p. 165.

Forma FOLIOSA, *mihi.*

Planta cæspitosa; caules foliosi; folia carnosula basi ciliolata.

Hab. Villa Nova de Portimao, in Portugal, 1847 (*Welw.*, *Herb. Algarb.*, n. 693).

β. ARAGONENSIS, *Pau, Not. Bot. Fl. Espan.*, i. p. 21 (1887); *Willk.*, *Prodr. Fl. Hisp.*, *suppl.*, p. 281 (1893).

Calyx nervis vix anastomosantibus. Petala bidentata, dentibus nec divergentibus.

Hab. Aragon.

Geogr. limits.—*N.* France, depart. of Drôme.
E. Corsica, near Calvi.
S. Canary Isles.
W. Madeira.

Series 10. *Leiocalycinæ.*[*]

Calyx fructifer apice contractus. Calyx glaber vel brevissime scabrius-culus, vel rarius glanduloso-pubescens.

a. Calyx evenius.

a. Calyx dentibus acutis.

232. S. CRETICA, *Linn.*, *Sp. Plant.*, ed. I. p. 420; *Dill.*, *Hort. Eltham.*, p. 423, t. 314, fig. 404; *Rohrb.*, *Monogr.*, p. 167.

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[*] The characters of this and the next series are modified in accordance with the suggestions of C. M. Lindman (1891).

Adde syn. S. Dilleniana, *Schott, in Desf. Cat. Hort. Paris.* ed. III. p. 264 (*vide Rohrb., Monogr.*, p. 228, uti sp. dubia).

Ex *syn.* S. tenuiflora, *Guss.* (species propria).

In a few floras this species is described as having nerves anastomosing on the calyx, but in all the authentic specimens I have examined, the ten simple prominent nerves have been quite free from any secondary or connecting striæ: this is the more easy to demonstrate, since the surface of the calyx is quite glabrous.

This polymorphous species is generally distributed through almost the whole of the Mediterranean region, and from thence into the warmer parts of Central Europe: being sometimes introduced with flax, it has become naturalized elsewhere, as almost to appear indigenous.

233. SILENE UNGERI, *Fenzl, in Unger, Reise in Griechenl.*, p. 136 (1862); *Rohrb., Monogr.*, p. 155, n. 145.

Hæc species pulchra ex cl. Heldreichii observationibus et ex speciminibus fructiferis, calyce fructifero apice contracto gaudet ideo non inter *Seriem* 8 — *Atocia* — sed juxta *S. antirrhinam* militat: vide Oesterr. Bot. Zeitschrift, 1878, p. 29. Ergo planta iterum hîc descripta est.

Caulis erectus superne vel e basi paullum ramosus, glaberrimus superne viscidus. Folia inferiora rosulata, obovato-spathulata, obtusissima, hirtello-puberula, ciliolata, superiora lanceolata vel lineari-lanceolata, acuta; bracteæ cum prophyllis parvæ acutæ ciliatæ. Pedunculi tenues calyce multo longiores. Calyx cylindrico-clavatus, rubellus, basi attenuatus, subumbilicatus, nervis saturatius rubellis prominentibus, dentibus ovatis, acuminatis, late albo-marginatis. Petala purpurea, unguibus exsertis, laminâ oblongâ integrâ vel vix emarginatâ, appendicibus binis elongatis, lanceolatis. Capsula ovali-oblonga, carpophorum æquans. Semina tuberculata, dorso convexa, faciebus planiuscula.

Syn. S. ætolica, *Heldr. in Atti, Congr. Bot. Firenze* (1874), p. 239.

S. Rohrbachiana, *Aschers., mss. in Pl. Schrad. e Corcyrâ.*

Hab. Greece.—*N.* and *W.* Corfu } in the Ionian Islands.
S. Ithaca }
E. Near Mesolonghi, in Livadia.

234. S. GRANDIFLORA, *Franch., Pl. Yunnan. in Bull. Soc. Bot. France*, xxxiii. (1886) p. 427; *Pl. Delavay.*, t. 23.

Caulis elatus e basi ramosus, ramis gracilibus elongatis, tenuiter retrorsum pubescentibus, ultra medium foliatis. Folia e basi brevissime attenuata vel subrotunda anguste lanceolata, longe acuminata, scabrida, margine ciliata; bracteæ cum prophyllis paullum minores angustiores. Flores pauci, pedicellis, præsertim in flore primario, elongatis pubescentibus. Calyx clavato-tubulosus rubescens, pubescens, inferne angustatus et leviter umbilicatus, dentibus ovatis. Petala intense rubra, unguibus exsertis, glabris, in auriculas rotundatas erosas dilatatis, laminâ obcordatâ bilobâ lobis rotundatis. Filamenta glabra. Capsula ovata carpophorum æquans.

A plant with very large flowers, and in this respect rather resembling a species of *Eudianthe* or *Lychnis*; but the ovary is trilocular at the base, and the dehiscent capsule has six teeth. The petals are nearly 30 mm. long, and 12 mm. across at the broadest part of the blade; and the broadly auriculate claws distinguish it from most of the annual species of the section Dichasiosilene. It may be here observed that the majority of the 17 species of *Silene* from Yun-nan, described by Mons. Franchet, should be excluded from the genus, as the capsules are not trilocular at the base.

Hab. Near Tali, in the plain of Ho-kin, in the prov. of Yun-nan, China.

β. Calyx dentibus obtusis.

235. SILENE ANTIRRHINA, *Linn.*, *Sp. Plant.*, ed. I. p. 419; *Dill.*, *Hort. Eltham.*, p. 422, t. 313, fig. 403; *Rohrb.*, *Monogr.*, p. 168.

Syn. Saponaria dioica, *Cham. et Schlecht. in Linnæa*, i. (1826) p. 38 (non *Linn.*).
Saponaria Vaccaria, *Mandon*, *Pl. Boliv.*, n. 984 (non *Linn.*).

Lusus 2. *Tenuissima.* Folia linearia, infimis lineari-spathulatis. Calyx subglobosus.

Syn. S. antirrhina *var.* gracilis, *Camb. in A. St. Hil. Fl. Brasil. Mer.*, ii. p. 118; *Mart. Fl. Brasil.*, xiv. pars II. (1872) p. 291.
S. antirrhina *var.* linaria, *Wood*, *Class-Book*, ed. 1861, p. 256; *S. Wats.*, *Bibl. Index*, p. 107; *B. L. Robinson*, *in Proc. Amer. Acad.*, xxviii. (1893) p. 132.

Hab. Georgia and Florida, in the United States.

Lusus 3. *Tenuissima.* Folia linearia vel lanceolato-linearia. Rami floriferi divaricatim divergentes. Calyx ovoideus. Petala inclusa.

Syn. S. antirrhina *var.* divaricata, *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 132.

Hab. Illinois, in the United States.

Geogr. limits.—*N.* Canada; Rocky Mountains.
S. S. Chili.
E. Brazil.
W. Vancouver's Island (*Lyall*, 1858, in Herb. Kew.).

236. SILENE LÆVIGATA, *Sibth. et Sm., Prodr. Fl. Græc.*, i. (1806) p. 295; *Fl. Græca*, v. p. 13, t. 418; *Rohrb., Monogr.*, p. 168.

Emenda: Semina dorso trisulcata, faciebus plana.

Cf. *S. Behen*, quâ flores. Flores eis *S. Behen*, plus dimidio minores, lamina minor et angustior minus bifida, et nervi calycini venulis destituti.

Hab. Cyprus.

237. S. BOISSIERI, *J. Gay, ap. Coss., Not. Pl. Crit. Esp.*, ii. (1850) p. 32; *Boiss., Voy. Bot. Esp.*, ii. (1845) p. 93, t. 24 (S. ramosissima); *Rohrb., Monogr.*, p. 169.

By an over-strict application of the law of priority, *S. germana*, which is reduced to this species, might stand as the name of the plant, since it is described on the preceding page, but there seems to be inaccuracy in details in the textual description of the authentic specimens, by which its affinity with allied plants is obscured, so that to avoid possible confusion it is best and most convenient to adopt Gay's other plant as the type, as Rohrbach has done in his monograph, but without noting the discrepancy. Both plants are found on the same mountain.

Hab. Andalusia and Sicily; but Todaro's record in Sicily is somewhat doubtful.

b. Calyx nervis anastomosantibus.

a. Calyx dentibus acutis.

238. S. ALMOLÆ, *J. Gay, ap. Coss., Not. Pl. Crit. Esp.*, ii. (1850) p. 31; *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. (1853) p. 48, t. 33; *Rohrb., Monogr.*, p. 169.

Geogr. area. Spain.—*N.* and *E.* New Castile; near Aranjuez.
S. and *W.* Andalusia; near Ronda.

239. S. MUSCIPULA, *Linn., Sp. Plant.*, ed. I. p. 420; *Reichb., Ic. Fl. Germ. Helv.*, n. 5077; *Rohrb., Monogr.*, p. 170.

Forma ANGUSTIFOLIA.—Rami patuli. Folia omnia anguste lineari-lanceolata cuspidata.

Syn. S. Muscipula *var.* angustifolia, *Costa, Ampl. Pl. Catal.*, p. 32 (1873); *Willk. et Lange, Prodr. Fl. Hisp.*, iii. (1878) p. 663.

S. arvensis, *Losc.*, *Trat. Pl. Aragon*, p. 31 (1876); *Willk., Prodr. Fl. Hisp., suppl.*, p. 281 (1893).

β. CORYMBIFERA, *Bertol.* (sp.), *Fl. Italica*, iv. p. 591; *Tanfani, in Parl. Fl. Italiana*, ix. (1892) p. 406.

Pauciflora, ciliato-scabra; dichasio corymboso-fastigiato.

Geogr. limits.—*N.* Liguria, in Italy.
E. Coast of Syria, near Sidon.
S. Algeria.
W. Portugal (ut S. stricta *Link* [non *Linn.*]).

240. SILENE REINHOLDI, *Heldr. in Atti Congr. Bot. Firenze*, (1874) p. 239; *et Fl. Céphalon.*, p. 25 (1876).

Caulis erectus dichotomus. Folia glaucescentia, inferiora spathulata, ovato-oblonga, ciliata, apice rotundata, mucronata, superiora oblongo-lanceolata, floralia admodum diminuta. Flores laxe cymoso-racemosi, alares, longiuscule pedunculati, superiores secundi, cernui, pedunculis fructiferis patentibus. Calyx oblongus, citó ovoideo-inflatus, basi attenuatus, sed nunquam umbilicatus, apicem versus purpurascens, valde attenuato-constrictus, dentibus brevibus scariosis. Petala biloba, intense rosea, appendicibus brevibus acutis. Capsula subglobosa brevissime stipitata, apice conico-attenuata. Semina 4–5-sulcata, echinato-tuberculata.

Syn. S. pseudo-behen, *Heldr.* exs.

Geogr. limits.—*N.* Kastri (Delphi), in Livadia.
S. and *E.* Island of Lero, off the coast of Anatolia.
W. Ionian Islands; Cephalonia.

241. S. STRICTA, *Linn., Cent. Plant.*, ii. p. 17; *et Amœn. Acad.*, iv. p. 314 (1756); *Willk., Ic. Descr. Pl. Nov. Hisp.*, i. (1853) p. 56, t. 40; *Rohrb., Monogr.*, p. 171.

A *S. Muscipulâ* differt, calycis dentibus elongatis, acutissimis, ciliatis, nervis primariis herbaceo-alatis, petalis parvis exauriculatis, capsulæ seminumque formâ.

Geogr. limits.—*N.* and *E.* Sicily.
S. Morocco.
W. Portugal (*ex Nym., Consp. Fl. Eur.*).

242. SILENE TENUIFLORA, *Guss.*, *Pl. Rar.*, p. 177, t. 36 (1826); *Dill.*, *Hort. Eltham.*, p. 423, t. 314, fig. 404; *Lindm. in Act. Hort. Berg.*, i. (1891) n. 6, p. 6, figg. 21–25; *Rohrb.*, *Monogr.*, p. 167 (*sub* S. creticâ).

Inferne puberula, superne viscidula. Caulis tenuis in cymam corymbosam stricte dichotomam dividens. Folia radicalia spathulata, obtusa, in petiolum attenuata, superiora cum bracteis anguste linearia, acuta. Flores in cymas regulares dispositi, et mediani et laterales longe pedicellati. Calyx 14–16 mm. longus, clavato-cylindraceus leviter umbilicatus superne atro-purpurascens, fructifer clavatus infra medium leviter constrictus apice sensim contractus, nervis rubris, dentibus ovato-triangularibus anguste albo-marginatis. Petala purpurea, unguibus exsertis, obovato-cuneata, obcordato-emarginata, appendicibus bipartitis, hujusque laciniis oblongis rotundato-obtusis, vel interdum subacutis. Capsula ovata carpophorum duplo superans. Semina tuberculata, dorso faciebusque planiuscula.

Lindman, who has carefully studied the characters of the plant in the living state, shares the opinion of Boissier (*Fl. Orient.*, i. p. 585), that this species is quite distinct from *S. cretica.*

Geogr. limits.—*N.* Albano, near Rome, *Lindman.*
S. Sicily, *Gussone.*
E. Base of Mt. Parnassus, in Greece, *Heldreich*, *ex Boiss.*, *Fl. Orient.*, *l.c.*
W. Andalusia, *Reverchon* ("S. cretica").

β. Calyx dentibus obtusis.

243. S. BEHEN, *Linn.*, *Sp. Plant.*, ed. I. p. 418; *Dill.*, *Hort. Eltham.*, p. 427, t. 317, fig. 409; *Rohrb.*, *Monogr.*, p. 169.

Affinis *S. lævigatæ* a quâ, ceteris neglectis, jam calyce umbilicato nervis anastomosantibus differt.

Geogr. limits.—*N.* Prov. of Cagliari, in Sardinia.
S. and *W.* Canary Islands (S. ignobilis, *Lowe*).
E. Palestine.

244. S. HOLZMANNI, *Heldr. in Boiss.*, *Fl. Orient.*, *suppl.*, p. 91 (1888); *Nym.*, *Consp. Fl. Eur.*, *suppl.*, ii. p. 54.

Glaucescens, glabra. Caulis dichotomus, ramis crassiusculis. Folia lanceolata utrinque attenuata, obtusa, suprema lanceolato-linearia, acuta. Dichasii internodii brevissimi. Calyx oblongus rubellus, fructifer ovato-inflatus, dentibus ovatis. Petala minuta, biloba, unguibus exsertis. Capsula ovata subsessilis. Semina seriatim echinulata, dorso plana, faciebus concava.

Valde affinis *S. Behen*; an ejus varietas salsuginosa? Differt inflorescentiâ ob internodia abbreviata coarctatâ, caule et ramis crassis, calycibus basi attenuatis, seminibus echinulatis.

Hab. The rock of Arpedon, off the coast of Anatolia.

245. SILENE LINICOLA, *C. C. Gmel., Fl. Badens.*, iv. (1826) p. 304; *Reichb., Ic. Fl. Germ. Helv.*, n. 5076; *Rohrb., Monogr.*, p. 171.

Adde: Calyx umbilicatus; filamenta glabra; semina granulata.

Geogr. limits.—*N.* and *W.* Luxemburg (*Nym., Consp. Fl. Eur., suppl.*, ii. p. 54).
S. Campo Marzio, on the Austrian coast, in the prov. of Göritz, near Trieste (*Marchesetti, ex Parl., Fl. Italiana*, ix. p. 410).
E. Prov. of Carniola.

Tenore's southern record in Sicily is erroneous, though it has been introduced into the island with flax, as into other localities.

246. S. CRASSIPES, *Fenzl, Pugill. Plant. Nov. Syr.*, p. 8 (1842); *Rohrb., Monogr.*, p. 172.

β. ASSYRIACA, *Haussk. et Bornm. exs.* (sp.) *in Bornm., It. Persico-turcicum*, 1893, n. 975 (an species propria ?).

Folia inferiora ovata. Petala emarginato-biloba.

As C. M. Lindman rightly points out, this species should not be referred to the series *Lasiocalycinæ*, as the nerves of the calyx anastomose, and the plant otherwise differs very little from *S. linicola*. For the same reason, *S. gonocalyx*, Boiss., should be a distinct species, instead of being joined with *S. crassipes*, as Rohrbach has done.

Geogr. limits.—*N.* Mt. Nimroud-dagh, in prov. of Musch (*Sintenis*, Iter Orientale, 1888).
S. and *W.* Coast of Syria, near Sidon.
E. Mt. Kuh-Sefin, in Kurdistan (*var. β*).

Series 11. *Lasiocalycinæ.*

Calyx fructifer apice contractus. Calyx evenius, valde costatus; costæ pilis longis vel squamis distinctis vestitæ.

a. Petala integra vel emarginata.

247. S. GONOCALYX, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 38; *Fl. Orient.*, i. p. 587, *et suppl.*, p. 92.

Caulis erectus e basi divaricatim ramosus punctato-scabridulus. Folia inferiora oblongo-spathulata, superiora lanceolata, acuta, scabrida; bracteæ lineares. Flores subsessiles, alares, et ad ramos supremos breves 3–5-conferti. Calyx coriaceus, cylindricus, fructifer clavatus, infra capsulam constrictus, dentibus rotundis, ovatis, late albo-marginatis, ciliatis. Petala rosea, obovato-oblonga, integra, appendicibus binis acutis. Capsula ovata, carpophoro crasso duplo longior. Semina dorso lato obtuse canaliculata, faciebus auriformi-curvato-excavata.

Inflorescentia vel dichotoma cymosa vel sæpius e cymis contractis ad ramos alternos terminalibus paniculatis constans.

Geogr. limits.—*N.* Aïn-Tab, in prov. of Aleppo.
S. Jerusalem.

248. SILENE PTERONEURA, *mihi*; *Ball et Claraz* (var.), *in Journ. Linn. Soc.* (*Bot.*), xxi. (1886) p. 213.

Basi retrorsum puberula, superne glabra viscida. Caules erecti furcati. Folia elongato-linearia, acuminata, ciliata; bracteæ foliis conformes. Flores longissime pedicellati. Calyx viridis ovatus, fructifer ovoideus, costis herbaceis undulato-alatis, dentibus oblongo-ovatis obtusis. Petala carnea, emarginata, appendicibus binis parvis. Capsula ovoidea subsessilis. Semina seriatim tuberculata, dorso faciebusque plana.

On account of the distinctive character of the nerves of the calyx, it does not seem to belong to the same series as *S. antirrhina.*

Hab. Near Bahia Blanca, in the Argentine Republic.

b. Petala bifida vel bipartita.

249. S. PAPILLOSA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 39; *Rohrb.*, *Monogr.*, p. 172.

Affinis *S. crassipedi*, sed distinctissima nervorum dentiumque calycinorum structurâ, et laminâ bifidâ magis exsertâ.

Geogr. limits.—*N.* Guzuldere, near Mersina, in Cilicia.
S. Nahr el Kelb, on the Syrian coast
E. Gadir, in the Lebanon } (*Peyron, ex Boiss.*, *Fl. Orient.*, *suppl.*, p. 92).
W. S. coast of Anatolia.

250. S. ECHINATA, *Otth, in DC. Prodr.*, i. p. 380; *Rohrb.*, *Monogr.*, p. 172.

Calycis indumento accedit ad *S. trinerviam*, quæ tamen primo aspectu inflorescentiâ differt. *S. papillosa* calyce breviore, fructifero infra capsulam carpophorum ter superantem constricto facile distinguitur.

Hab. Italy

251. SILENE SQUAMIGERA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 38; *Jaub. et Spach*, *Illustr. Plant. Or.*, i. p. 8, t. 4 (S. echinata); *Rohrb.*, *Monogr.*, p. 173.

Differt a *S. echinatâ* calycis nervis a squamis nec pilis obsitis, petalis albis, seminum formâ.

β. ANTIOCHICA, *Freyn* (sp.), *in Bull. Herb. Boiss.*, iii. (1895) p. 78.

Caules dichotomi, ramis rigidis. Calyx cylindricus purpurescens. Petala carnea.

Geogr. limits.—*N.* Mt. Sipuli, in Anatolia.
E. Prov. of Marasch.
S. Elmalu, in Anatolia.
W. Nome of Ætolia, in Livadia.

252. S. VESICULIFERA, *J. Gay*, *ap. Boiss.*, *Fl. Orient.*, i. p. 586; *Rohrb.*, *Monogr.*, p. 173.

Valde affinis priori, a quâ tamen calycis formâ, dentibus elongatis, squamarum naturâ, petalis angustioribus et capsulâ globosâ satis differt.

Hab. Mt. Taurus, in Cilicia.

Sectio III. BOTRYOSILENE.

Herbæ perennes suffruticesve. Flores in racemo simplici vel composito breviter vel longe pedicellati: racemi ramis aut brevibus paucifloris, aut elongatis iterum racemosis vel cymuliferis vel, omnibus cymarum internodiis abbreviatis, verticillastriferis, interdum axis primariæ intra inflorescentiam internodiis contractis flores capitulum formantes; raro abortu caulis tri-vel uniflorus.

A. Calyx glaberrimus coriaceus, cylindrico-vel conico-clavatus, sæpe basi annulo circulari pseudoumbilicatus.

Series 1. *Sclerocalycinæ.*

a. Pedicelli ima basi bibracteolati.

253. S. FRIWALDZKYANA, *Hampe*, *in Flora*, xx. (1837) p. 226; *Rohrb.*, *Monogr.*, p. 175.

As *S. colorata*, Poir., is now sunk in *S. sericea*, by the strict application of the law of priority Hampe's name (1837) would yield to *S. colorata*, Friw. (1835); but Friwaldzky himself, knowing afterwards of *S. colorata*, Poir., in a letter to Grisebach (1839) changed the name of his plant to *S. tincta*, not, however, before Hampe had published a description of the same plant under the name by which it is at present known.

Geogr. limits.—*N.* and *W.* Carlova, in Bulgaria. } *Velenovsky*
E. Varna, in Bulgaria. } (1885).
S. Mt. Rhodope, in Turkey.

b. Pedicelli medium versus vel infra calycem bibracteolati.

a. Filamenta glabra.

† Flores erecti.

(1) Calyx dentibus omnibus acutis vel mucronatis.

254. Silene bupleuroides, *Linn.*, *Sp. Plant.*, ed. I. p. 421; *Tournef.*, *Coroll. Voy.*, p. 380, t. 154 (Lychnis orientalis bupleurifolia); *Rohrb.*, *Monogr.*, p. 175.

Species ab auctoribus fere omnibus cum *S. longiflorâ* commutata, a quâ calycis dimidio brevioris dentibus omnibus acutis facile distingui potest; *S. caramanica* autem jam pruinosa et calyce multo longiore punctato differt.

Hab. Armenia.

255. S. avromana, *Boiss. et Haussk. in Boiss.*, *Fl. Orient.*, *suppl.*, p. 105.

Cæspitosa, glabra, glauca. Caules erecti, inferne parce foliosi, viscidi. Folia radicalia sæpe elevatim punctata, oblonga, obtusa, mucronulata, in petiolum longe attenuata, margine scabridula, superiora viscidula, anguste linearia, longe subulata. Flores magni approximati, pedunculo alarium calycem sæpe æquante, lateralium breviore. Calyx tubulosus, sensim dilatatus, umbilicatus, fructifer clavatus, evenius, dentibus triangulari-lanceolatis, acutis. Petala fuscescentia, biloba, appendicibus binis ovatis. Capsula oblonga carpophorum æquans.

Quamvis foliis, inflorescentiâ, habitu *S. Sieberi* et *S. eremiticæ* similis, tamen ob calycem evenium coriaceum acute dentatum fructiferum sub capsulâ non abrupte constrictum militat, folii parvis brevibus obtusis, ab omnibus affinibus distincta.

Hab. Mt. Avroman.

256. S. caramanica, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 90; *Coss.*, *Illustr. Fl. Atlant.*, fasc. iv. (1890) t. 95; *Rohrb.*, *Monogr.*, p. 176.

Adde: Nervi calycini sparse furcati vix conjuncti.

β. SOLENOCALYX, *Boiss., Diagn. Pl. Nov. Or.*, Ser. II. v. p. 57 (S. bupleuroides *var.* solenocalyx); *Rohrb., Monogr.*, p. 176.

Folia linearia graminea, vix scabrida; calyx rubro-venius.

Geogr. limits.—Turkey in Asia.
N. Near Erzeroum, in Armenia.
S. and *W.* Between Ermenek and Karaman, in Cilicia.
E. Mt. Bingöl-Dagh, in prov. of Musch.

257. SILENE ROUYANA, *Battand. in Bull. Soc. Bot. France*, xxxv. (1888) p. 385; *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 147, t. 95.

Cæspitosa, glabra, glauca. Caules basi suffrutescentes erecti, superne viscidi. Folia radicalia lineari-lanceolata, vel anguste oblongo-lanceolata, acuta, in petiolum inferne squamiformi-dilatatum attenuata, media sæpius angustiora, superiora lineari-subulata, rigidula, sæpius pungentia, plus minus membranaceo-marginata, margine membranaceo tenuissime denticulato. Flores solitarii, caulem et ramos laterales quando adsunt terminantes. Calyx 22–30 mm. longus, tubuloso-infundibuliformis, annulo circulari pseudoumbilicatus, fructifer superne cylindraceo-dilatatus, infra capsulam angustior, nervis anastomosantibus sæpe rubellis, dentibus inæquilongis, ovato-triangularibus, mucronatis, membranaceo-marginatis, brevissime ciliatis. Petala bifida, intus albida, extus tigrino-purpurea, lobis oblongo-linearibus obtusis, appendicibus binis ovato-lanceolatis, acutis, inferne convexo-gibbosis. Filamenta glabra. Capsula cylindrica, apice conica, carpophoro duplo longior. Semina reniformia, compressa, dorso granulato canaliculata, faciebus plana.

S. caramanica differt, ceteris neglectis, calyce punctis elevatis tuberculato, petalorum laminis linearibus angustioribus, appendicibus apice fimbriatis vel serrato-erosulis, et stipite capsulæ subæquilongo non subduplo breviore.

Hab. Algeria; Mt. Mzi, in prov. Oran.

258. S. MACROSOLEN, *Steud. in Schimp., Pl. Abyssin.*, ii. n. 661; *ex A. Rich., Tent. Fl. Abyssin.*, i. p. 44 (1847); *Rohrb., Monogr.*, p. 176.

Hab. Abyssinia.

259. SILENE TENUICAULIS, *Freyn et Bornm.* (ined.) *in Pl. Exs. Anatoliæ Orient.*, n. 1314 (anno 1889).

Glauca, glabra, cæspitosa. Caules adscendenti-erecti seu erecti, sæpe turiones foliosos edentes, graciliter tenues, simplices. Folia inferiora anguste lineari-lanceolata, acuminata, in petiolum longissimum attenuata, superiora elongato-linearia, longius acuminata, basi membranaceo-vaginantia, omnia uninervia, glabra; bracteæ e basi ovatâ caudato-acuminatâ, semi-herbaceæ. Flores in racemis simplicibus, brevius pedicellati. Calyx longe clavato-cylindricus, annulo circulari pseudoumbilicatus, fructifer infra capsulam admodum attenuatus, evenius. Petala albida (?) siccitate fuscescentia, biloba. Capsula oblonga carpophorum fere æquans. Semina tuberculata parva, dorso canaliculata, faciebus plana.

Described from specimens preserved in Herb. Kew. The name is derived from the slender flowering stems. *S. avromana*, *S. Parrowiana*, and *S. tenuicaulis* are distinguished from the other four species of the group in the calyx being without anastomosing nerves: though in *S. caramanica* the bifurcations of the primary nerves are very faint and scarcely to be made out.

Hab. Pine-forests on Mt. Ak-dagh.

260. S. MEGALOCALYX, *Freyn, in Bull. Herb. Boiss.*, iii. (1895) p. 82.

Glauca, glabra, cæspitosa, viscida, 60 centim. alt. Caules dichotomi, ramis unifloris. Folia inferiora spathulato-lanceolata, apiculata, in petiolum longum sensim angustata, vaginâ pallidâ subciliatâ, caulina lanceolata sensim diminuta. Flores in anthelâ dispositi, maximi, longe pedunculati Calyx cylindricus, fructifer valde clavatus, evenius, dentibus acutis triangularibus. Petala bifida, lobis obovato-oblongis, appendicibus binis linearibus. Capsula ellipsoidea carpophorum fere æquans. Semina magna, dorso tuberculato-rugulosa canaliculata, faciebus compressa.

Hab. Turkish Armenia; Mt. Kyl-Maghara-dagh, near Egin, in prov. of Siwas (*Sintenis*, exsicc. n. 2895).

261. S. PARROWIANA, *Boiss. et Haussk. in Boiss., Fl. Orient., suppl.*, p. 97.

Glauca, glabra, 30 centim. alt. Caules simplices foliati. Folia carnosula, acuta, vel acuminata inferiora oblonga in petiolum longum attenuata, superiora linearia diminuta;

bracteæ brevissimæ lineari-subulatæ. Cymulæ oppositæ pedunculatæ racemum oblongum formantes; flores parvi, pedicellis calyce brevioribus. Calyx obconico-turbinatus, subcostatus, dentibus ovatis, late membranaceo-marginatis, ciliolatis. Petala virentia, bipartita, lobis linearibus, unguibus ciliatis, apice dilatatis. Capsula carpophoro multoties longior.

Ab omnibus affinibus, cito distinguitur capsulâ subsessili.

Hab. Mt. Lolan and Mt. Parrow, in W. Persia, near Kermanschah.

(2) Calyx dentibus alternatim obtusis et acutis, albomarginatis ciliatis.

a. Folia glabra.

262. SILENE CHLORÆFOLIA, *Sm.*, *Ic. Ined.*, i. p. 14, t. 13 (1789); *Bot. Mag.*, t. 807; *Rohrb.*, *Monogr.*, p. 177.

Adde syn. S. perfoliata, *Otth, in DC. Prodr.*, i. p. 384.

β. SWERTIÆFOLIA, *Boiss.* (sp.), *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 32.

γ. MAKMELIANA, *Boiss.* (sp.), *l.c.*, viii. p. 89.

δ. SCHIMPERIANA, *Boiss.* (sp.), *l.c.*, i. p. 31.

Geogr. limits.—*N.* Prov. of Trans-Caucasia (*Rupr.*, *Fl. Caucasi*, p. 196).
S. Mt. Sinai (*Schimper*, nos. 422, 283, "S. dianthoides," non *Pers.*).
E. Mt. Demawend, in prov. of Mazanderan, N. Persia (*var. β*, vide Aucher-Eloy, no. 4215).
W. Anatolia.

263. S. LONGIFLORA, *Ehrh.*, *Beitr.*, vii. p. 144; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5107; *Rohrb.*, *Monogr.*, p. 178.

Ex syn. S. staticefolia est species propria.

Geogr. limits.—*N.* and *W.* At the base of the Radobil, near Leitmeritz, in Bohemia (*C. A. Mayer*, and vide *Garcke*, *Fl. Deutschl.* [ed. 1885], p. 65).
S. Near Bethlehem, in Judæa (*Pichler* [1889], *ex Bull. Herb. Boiss.*, iii. [1895] p. 82).
E. Mt. Demawend, in prov. of Mazanderan, N. Persia (forma alpina).

264. SILENE STATICIFOLIA, *Sibth. et Sm.*, *Fl. Græc. Prodr.*, i. (1806) p. 301; *Fl. Græca*, v. p. 24, t. 434.

Cæspitosa, glauca, glabra, foliosa, pauciflora, viscida. Caulis adscendenti-erectus simplex, apice racemosus, nodoso-incrassatus. Folia acuta, plana, integerrima, uninervia, radicalia, anguste lanceolata vel spathulata, in petiolum longum attenuata, caulina abbreviata, erecto-adpressa, vix petiolata; bracteæ binæ ovatæ, acuminatæ, medium versus pedunculorum. Flores 3–5, majusculi, remoti. Calyx 18–20 mm. longus, clavatus, pallidus, nervis rubicundis anastomosantibus. Petala suprà nivea, subtus ferruginea, unguibus superne dilatatis, bipartita, lobis obovatis incurvis obtusis appendicibus bifidis obtusis. Capsula ovata carpophoro duplo brevior.

E. Boissier hanc e montibus Korax Aetoliæ et Œta Phthiotidis, ab Heldreich lectam vidit (non e Peloponneso cognitam); secus Haussknecht, qui eam in Pindo Tymphæa 1885 legit, a *S. longiflora* valde diversa est.

Syn. S. longiflora, *var.* staticifolia, *Boiss.*, *Fl. Orient.*, *suppl.*, p. 103.

Hab. N. Greece.

265. S. CÆSAREA, *Boiss. et Bal.*, *Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 31; *Rohrb.*, *Monogr.*, p. 179.

Hab. Elmalu, in Anatolia, and Mt. Ali-dagh, in prov. of Siwas.

266. S. LAXA, *Boiss. et Kotschy in Boiss.*, *Fl. Orient.*, i. p. 638; *Rohrb.*, *Monogr.*, p. 179.

Præcedenti affinis, differt foliis superioribus subcordatis, summis ad basin paniculæ vix diminutis, paniculæ laxioris ramis elongatis.

Hab. Near Goschkar, at the base of Mt. Bingöl-dagh, in Turkish Armenia.

267. S. PEDUNCULARIS, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 30; *Delponte in Mem. Accad. Torino*, Ser. II. xxvi. (1871) t. 3; *Rohrb.*, *Monogr.*, p. 180.

Forma MACROCALYX, *Boiss.*, *Fl. Orient.*, *suppl.*, p. 105.

Calyx elongatus, 18 mm. longus.

Hab. Mt. Sawers, in W. Persia.

Geogr. limits.—N. Near Alliar, in district of Karabagh, Trans-Caucasia.
S. and *W.* Mt. Hermon, in Syria.
E. Mt. Elburz, in N. Persia.

268. SILENE ARMENA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. p. 29; *Rohrb., Monogr.*, p. 180.

β. SCABRIDULA, *Boiss.* (sp.), *Fl. Orient.*, i. p. 643.

Pruinoso-scabridula, canescens, superne glabra, viscidula. Caules sæpius simplices. Folia inferiora lineari-lanceolata. Calyx albidus tenuiter cylindricus, dentibus lanceolatis.

Geogr. limits.—N. Mountains of Trebizond.
E. Prov. of Erzeroum.
S. and *W.* Mt. Taurus, in Cilicia.

β. Folia serrulato-scabra.

269. S. SERRULATA, *Boiss., Fl. Orient.*, i. p. 643; *Rohrb., Monogr.*, p. 180.

Hab. Anatolia; hills near Elmalu.

(3) Calyx dentibus omnibus ovatis obtusis albo-marginatis ciliatis.

270. S. BALANSÆ, *Boiss., Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 31; *Rohrb., Monogr.*, p. 181.

Hab. Mt. Aslan-dagh and Mt. Masmeneu-dagh, in Cappadocia.

†† Flores cernui.

(1) Calyx dentibus omnibus acutis vel obtusis.

271. S. STRUTHIOLOIDES, *A. Gray, Bot. U.S. Expl. Exped.*, i. p. 109, t. 10; *Rohrb., Monogr.*, p. 181.

A species remarkable for its squarrose habit; a character not noted in the description.

Hab. Sandwich Islands.

272. S. MANISSADJIANI, *Freyn, in Bull. Herb. Boiss.*, iii. (1895) p. 83.

Glaucescens, præter basin tomentellam glabra, superne viscida, suffrutescens. Caules 30-60 centim., diffuse paniculati, ramis 1-3-floris, fragilibus tenuissimis bracteatis. Folia glabra, plana, uninervia, acuta, inferiora lanceolato-spathulata, in petiolum æquilongum basi dilatatum sensim angustata, margine serrulato-scabra, caulina lanceolata, subsessilia; bracteæ lanceolato-

lineares, parvæ. Flores parvi, pedicellis divaricatis. Calyx 10 mm. longus, nervis superne anastomosantibus, dentibus ovatis obtusis membranaceo-marginatis ciliolatis. Petala flavo-virescentia, ecoronata, bifida, lobis linearibus. Capsula ellipsoidea carpophoro pubescente triplo longior.

Hab. On pastures of Mt. Ak-dagh, near Amasia, in prov. of Siwas, Asia Minor (Sept., 1892), where also is found *S. xylobasis.*

(2) Calyx dentibus alternatim acutis et obtusis albo-marginatis.

273. SILENE LIBANOTICA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 89; *Rohrb., Monogr.*, p. 181.

Geogr. limits.—N. Mt. Lebanon, in Syria.
S. Hebron, in Judæa.

β. Filamenta ciliata.

† Flores erecti.

274. S. RADICOSA, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. I. vi. p. 24; *Rohrb., Monogr.*, p. 182.

Species foliis dense ciliatis et calyce coriaceo sulcato notabilis.

Ex syn. S. oligantha est species propria.
S. radicosa *var.* breviflora = S. oligantha.

Haussknecht says that the very different form of the leaves, the nodding flowers, the short broad calyx-teeth, and the shorter calyx and capsule, should serve to distinguish easily *S. oligantha* from this plant.

Hab. Greece.

275. S. TUNICOIDES, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 34; *Rohrb., Monogr.*, p. 182.

Tunicæ sp. videtur, sed nervi calycini commissurales et styli 3 adsunt.

Hab. Marmoritza, in Anatolia.

†† Flores cernui.

276. S. OLIGANTHA, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. II. i. p. 75 (1854).

Caules cæspitosi, numerosi, adscendentes, parce foliosi, ramulis secus partem superiorem caulis oppositis, remotis, altero abortivo brevibus strictis unifloris rarius 2–3-floris, inferne hirtulo-pubescentes, superne glabri. Folia inferiora obovata, spathulata, obtusa, brevius mucronata, in petiolum longum ciliatum attenuata, caulina pauca, linearia; bracteæ lineari-lanceolatæ, acutæ, albo-marginatæ, ciliatæ. Flores pauci, longius pedicellati. Calyx 8 mm. longus, obconico-pyriformis, fructifer breviter clavatus, leviter umbilicatus, evenius, nervis costatis, dentibus ovato-triangularibus, acutis, rectis, albo-marginatis, ciliatis. Petala flavida, unguibus glabris, bipartita, lobis linearibus, appendicibus bipartitis, laciniis ovato-triangularibus. Capsula ovata, carpophorum bis superans. Semina dorso tuberculato canaliculata, faciebus plana.

Syn. S. radicosa *var.* breviflora, *Boiss.*, *Fl. Orient.*, i. p. 645.

Forma SUBUNIFLORA, *mihi*: *Baldacci*, *It. Albanicum* (1892), n. 112; *et in Malpighia* (1894), p. 85.

Rami uniflori.

Hab. Mt. Kiore [Montes Ceraunii], in Albaniâ.

Forma STENOPHYLLA, *mihi*.

Folia angustata, lineari-spathulata, lineariave.

Syn. S. oligantha *var.* stenophylla, *Boiss. et Heldr.*, *Diagn. Pl. Nov. Or.*, Ser. II. i. p. 75.

Hab. Mt. Parnassus, near Delphi; and Mt. Malevo, in the nome of Laconia.

Hæc species est affinis *S. radicosæ*, quæ differt foliis radicalibus angustioribus, longius mucronatis, floribus erectis, calyce florifero campanulato-cylindrico, 12 mm. longo, in dentes patenti-recurvos abeunti.

Geogr. area.—Greece.

B. Calyx membranaceus, rarissime coriaceus simulque pubescens, basi truncatus vel umbilicatus.

a. Flores in racemis simplicibus, axis primariæ internodiis nunquam abbreviatis, racemi ramis brevibus oppositis interdum altero abortivo alternis, omnibus unifloris vel interdum inferioribus 3–7-floris, superioribus tantum unifloris.

Series 2. *Chloranthæ*.

Pedicelli imâ basi binis prophyllis præditi. Petala bipartita, raro retusa.

A. Petala bipartita vel bifida.

a. Capsula carpophorum 2–4-plo superans: calyx glaberrimus, raro glanduloso-pubescens.

277. **SILENE CHLORANTHA,** *Ehrh.*, *Beitr.*, vii. p. 145; *Dill.*, *Hort. Eltham.*, p. 425, t. 316, fig. 408; *Rohrb.*, *Monogr.*, p. 184.

Geogr. limits.—*W.* Prov. of Pomerania, in Prussia.
S. The Crimea.
N. Prov. of Livonia, in Russia.
E. Between the rivers Jaïk and Irtysch, in Siberia.

278. SILENE TATARICA, *Pers.*, *Syn. Plant.*, i. p. 497; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5100; *Rohrb.*, *Monogr.*, p. 184.

A beato Regel, *S. foliosa* et *S. macrostyla*, Maxim. cum *S. tatarica* conjunguntur. Differt autem utraque calycibus multo minoribus 5–7 mm. longis (in *S. tatarica* 9–12 mm.), sub anthesi clavato-campanulatis, nec clavato-tubulosis, striis calycinis superno arcuatim conjunctis, neque eveniis, calyce fructifero ampliato, neque oblongo, capsula ovato-oblonga, neque oblonga, bracteis ac prophyllis herbaceis, margine ciliato tantummodo scariosis, in *S. tatarica* totis scariosis.

Geogr. limits.—*N.* and *E.* Siberia.
S. On the banks of R. Terek, in prov. of Cis-Caucasia.
W. Banks of the Oder, near Frankfort, in the prov. of Brandenburg, Prussia (*ex Nym.*, *Consp. Fl. Eur.*, *suppl.*, ii. p. 53; *et Garcke*, *Fl. Deutschl.*, ed. 1885, p. 64).

279. S. FOLIOSA, *Maxim.*, *Prim. Fl. Amur.*, p. 53 (1859); *Rohrb.*, *Monogr.*, p. 185.

α. TYPICA, *Rohrb. in Linnæa*, xxxvi. (1870) p. 683.

Inflorescentia viscida. Petala, unguibus superne dilatatis, longe exsertis, profunde bipartita, lobis linearibus, appendicibus minutis vel nullis.

β. MACROSTYLA, *Maxim.* (sp.), *Prim. Fl. Amur.*, p. 54; *Rohrb.*, *Monogr.*, p. 185, *et in Linnæa*, xxxvi. (1870) p. 684.

Inflorescentia glabrescens, raro puberula. Petala, unguibus non dilatatis longe exsertis, lineari-oblonga ad medium bifida, ecoronata.

γ. MONGOLICA, *Maxim.*, *Enum. Pl. Mongol.*, p. 91 (1889).

Elatior, non viscida. Folia linearia. Calyx dentibus subobtusis. Petala, unguibus non dilatatis, parum exsertis, cuneata ad medium bifida, appendicibus minutis.

Geogr. limits.—*N.* R. Amur, on the borders of Siberia and
Mandschuria.
S. and *E.* Japan; island of Yesso (*var. a*).
W. Mongolia (*var. γ*).

280. SILENE TENUIS, *Willd.*, *Enum. Hort. Berol.*, p. 474; *Ledeb.*, *Pl. Fl. Rossicæ*, t. 160; *Rohrb.*, *Monogr.*, p. 186.

Variat caulis altitudine: eo elongato polyphyllo vel abbreviato oligophyllo, glabro vel plus minus viscido, racemo simplici raro basi ramoso, interdum, in formis humilibus grandifloris, in flores 1–2 reducto;—foliis latioribus et angustioribus, glabris, et basi tantum ciliatis, vel cum caulibus dense puberulis;—floribus erectis vel nutantibus, majoribus et minoribus. His omnibus characteribus minime constantibus ad varietates distinguendas uti nobis probabile non esse videtur, nam, ut hoc modo formæ valde affines secernantur, ex beato Regel conspectu quisque intelligere potest.

1. Ungues petalorum ciliati. Variat floribus majoribus et minoribus.

2. Ungues petalorum glabri. Variat floribus majoribus et minoribus, erectis et nutantibus: caulibus glabris et viscosis.

a. DASYPHYLLA: Caules erecti cum foliis lineari-setaceis dense puberuli, simplices raro basi subramosi.

b. JENISSEA: Caulis glabri sive viscosi, folia glabra basi tantum ciliata; petala lobis oblongis obtusis.

c. PAUCIFOLIA: Caules glabri humiles 1–2-flori, flores permagni; petala lobis magnis obovatis.

Geogr. limits.—*N.* Shores of the Arctic Ocean, N. Siberia.
S. N. W. India.
E. Stanowoi Mountains, E. Siberia.
W. Territory of the Samojedes, N.W. Siberia.

281. S. DOUGLASII, *Hook.*, *Fl. Bor. Amer.*, i. (1833) p. 88; *B. L. Robinson*, *in Proc. Amer. Acad.*, xxviii. (1893) p. 144; *Rohrb.*, *Monogr.*, p. 80.

Puberula vix glanduloso-viscida. Caules tenues, basi decumbentes, geniculati, dein ascendentes, simplices, remote foliati. Folia linearia vel anguste lanceolato-linearia, apice basique attenuata; bracteæ parvæ, acutæ. Flores in racemo paucifloro longe pedicellati. Calyx oblongus, fructifer infra capsulam attenuatus vix constrictus, haud umbilicatus, striis viridibus superne conjunctis, dentibus ovato-lanceolatis, obtusis, albo-marginatis, ciliatis, inflexis. Petala alba vel carnea, unguibus glabris, utrinque dente acuto auriculatis, paullum exsertis, bifida, lobis obtusis, appendicibus binis oblongis, obtusis. Capsula oblongo-cylindrica, superne attenuata, carpophorum ter superans. Semina dorso canaliculata, faciebus plana.

Syn. Cucubalus Douglasii, *Eaton, Man.*, ed. VII. p. 266.

In this revision of the genus, *S. Douglasii* is excluded from the subgenus *Gastrosilene*, in which it is placed by Rohrbach, for reasons which are given at length in the introduction. Examination of authentic specimens by different botanists requires that Rohrbach's description should be considerably amended. It is here described again, therefore, in its proper place in the genus. It is a common and polymorphous species in the United States, and the following varieties all of them tend to intergrade with the type, and are separated from it and from each other by no constant or important floral character. *S. multicaulis*, Macoun (non Guss. nec Nutt.), has also been reduced to this species, but is best considered as distinct, and is so described as the next species, *S. Macounii.*

β. MULTICAULIS, *Nutt.* (sp.) *in Torr. et Gray, Fl.*, i. p. 192; *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 144.

Griseo-tomentella. Caules rigidiores, magis foliati. Folia anguste lanceolata vel oblonga acuminata.

Syn. S. Drummondi var., *Torr. et Gray, Fl.*, i. p. 675.

Hab. States of Washington, Oregon, Idaho, and Montana.

γ. MACROCALYX, *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 145.

Puberula vel subglabra. Calyx cylindricus, 15 mm. longus.

Hab. States of Washington and Nevada.

δ. VISCIDA, *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 145.

Glanduloso-viscida, præsertim in parte superiore. Caules erecti, rigidi, e basi ramosa simplices. Folia magis carnosula. Calyx late oblongus vel fere campanulatus, brevis.

Hab. State of Washington, and Kicking Horse Pass in British Columbia.

ε. BRACHYCALYX, *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 145.

Puberula, non viscida. Folia anguste oblanceolata. Calyx campanulatus, brevis, latus.

Hab. State of Oregon.

Geogr. limits.—N. Kicking Horse Pass, in the Rocky Mtns., British Columbia (*var.* δ).
S. Wahsatch Mtns., in Utah (*var.* α).
E. Montana (*Canby, var.* β).
W. Oregon, on Sauvie's Island (*Howell,* 1880, *var.* ε).

282. Silene Macounii, *S. Wats. in Proc. Amer. Acad.*, xxvi. (1891) p. 124; *B. L. Robinson, l.c.*, xxviii. (1893) p. 145 (S. Douglasii, *var.* Macounii).

Caulis gracilis, adscendens, ramosus, puberulus, superne glanduloso-viscidus, 30 centim. longus, sparse foliatus. Folia lineari-oblanceolata, apice basique attenuata. Flores pauci, breviter pedicellati. Calyx-oblongo-campanulatus 9 mm. longus, dentibus triangularibus, obtusis, reticulato-venosis, purpureo-marginatis. Petala bifida, unguibus late auriculatis vix exsertis, laminâ flabelliformi, appendicibus quadratis subintegris. Capsula oblongo-ovata, carpophorum ter superans.

S. monanthæ valde similis, sed calyx florifer haud inflatus.

Syn. S. multicaulis, *Macoun, Cat. Canad. Pl.*, p. 494 (1883–1888).

Geogr. limits.—N. British Columbia, Selkirk Range.
E. British Columbia, Rocky Mtns.
S. and *W.* State of Washington.

283. S. lychnidea, *C. A. Mey., Verz. Pfl. Cauc.*, p. 213 (1831); *Rohrb., Monogr.*, p. 213.

Geogr. limits.—E. E. Caucasus (*Ruprecht, ex Boiss., Fl. Orient., suppl.*, p. 106).
W. W. Caucasus.

284. S. Reichenbachii, *Vis., Fl. Dalmatica,* iii. p. 169; *Rohrb., Monogr.*, p. 188.

β. umbrosa, *Vandas, in Sitzungsb. K. Böhm. Ges. Wiss.* (1890) p. 254.

Robustior, circa 50–60 centim. alta; foliis rosularibus et radicalibus latius lanceolatis, cum internodiis caulis inferioribus dense retrorsum puberulis.

Hab. In thickets on the slopes of Mt. Veleš Planina, above Potoci Han, in Herzegovina.

Geogr. limits.—*N.* and *W.* Mt. Velebitz, in Croatia, near Ostaria (*Borbás*, *ex Nym.*, *Consp. Fl. Eur.*, *suppl.*, ii. p. 53).
S. Mt. Orien, near Cattaro, in Herzegovina.
E. Herzegovina (*var. β*).

b. Capsula carpophorum æquans.

285. SILENE LINIFOLIA, *Sibth. et Sm.*, *Prodr. Fl. Græc.*, i. (1806) p. 301; *Fl. Græca*, v. p. 33, t. 433; *Rohrb.*, *Monogr.*, p. 188.

β. UMBROSA, *mihi.*

Caules flaccidiores, foliis læte viridibus, longioribus latioribusque. Calyx 17 mm. longus, nec 13 mm.

Syn. S. Ceccariniana, *Boiss. et Heldr.*, MSS.
S. linifolia, *var.* Ceccariniana, *Haussk. in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 50.

Hab. S. Albania (*Baldacci*, *It. Albanicum* [1892], n. 54; *et in Malpighia* [1894], p. 85); above Kalabaka, on Mt. Meteora (*Haussknecht*); Mt. Parnassus; near Livadia; and (*var. β*) near Phersala, in Thessaly.

186. S. GENISTIFOLIA, *Halácsy*, *in Oesterr. Bot. Zeitschr.*, xlii. (1892) p. 368.

Caules ramosi, elati, inferne scabriduli, superne viscidi. Folia radicalia sub anthesi emarcida, caulina lanceolata vel lineari-lanceolata, acuta, glabra, margine serrulato-scabra; bracteæ lineares. Flores longiuscule pedicellati, virginei subcernui. Calyx cylindrico-clavatus glaber, fructifer clavatus, nervis rubellis, dentibus acutis, albo-marginatis, ciliolatis. Petala livida, bipartita, lobis oblongis, appendicibus binis, parvis, lanceolatis. Capsula ovata, carpophoro subbrevior.

Characters verified from specimens in Herb. Kew.

Hab. Rumelia; Mt. Athos, between Krio-nero and Stradichori.

287. S. TURGIDA, *Bieb. ap. Bunge*, *Enum. Altaïc.*, p. 23 (1835); *Ledeb.*, *Pl. Fl. Rossicæ*, t. 138 (S. graminifolia); *Rohrb.*, *Monogr.*, p. 79.

No specimens in Herb. Kew. or Herb. Mus. Brit.

Hab. Altaï Mountains. (Schrenk's specimens from N.-W. Siberia mentioned by Ledebour, are to be referred to *S. tenuis*.)

B. Petala retusa.

288. SILENE SCAPOSA, *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 145.

Caules simplices, elati, 35 centim. longi, inferne scabriduli, superne viscidi, erecti. Folia glauca crassiuscula, radicalia oblanceolata, acuta, trinervia, caulina pauca, reducta, bracteæ foliis caulinis subconformes. Flores erecti. Calyx ellipticus, evenius, nervis viridibus. Petala albida, unguibus auriculatis vix exsertis, appendicibus binis parvis, obtusis.

Hab. United States; Oregon.

Series 3. *Suffruticosæ.*

Pedicelli medium versus seu apice binis prophyllis præditi. Petala integra, bipartita vel rarius laciniato-quadripartita.

A. Petala integra vel bipartita.

a. Capsula carpophoro superata.

289. S. NODULOSA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 31; *Rohrb., Monogr.*, p. 189.

Geogr. limits.—Persia.

N. Mt. Elamout, in N. Persia.
S. Mt. Kuh-Eschker, in prov. Fars (*Haussknecht, ex Boiss., Fl. Orient., suppl.*, p. 98).
E. Schiraz, in prov. Fars.
W. Mt. Kuh-Daëna, in prov. Fars.

290. S. GONIOCAULA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 31 *Rohrb., Monogr.*, p. 189.

Priori valde affinis, sed caulis peculiaritate ab hâc et ceteris diversa.

Hab. Persia; Mt. Elwend, in prov. of Irak-Adjemi.

b. Capsula carpophorum æquans, rarissime eo sesquilongior.

a. Calyx coriaceus, petala unguibus glabris.

† Petala bipartita, unguibus auriculatis.

291. S. ERIOCALYCINA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 28; *Rohrb., Monogr.*, p. 190.

β. LINEARIS, *Fenzl, in Kotschy Pl. exs.* n. 489, *ex Boiss., Fl. Orient.*, i. p. 615 (emend.).

Tomentello-canescens, fere argyrea. Folia inferiora lineari-lanceolata, superiora linearia. Calyx crispule hirsutus, brevior, clavato-pyriformis, fructifer amplius pyriformis, elevatim obtuse costatus inter costas viridis, insigniter sulcatus.

Hab. Prov. of Bagdad, and S. Persia.

292. SILENE CASPICA, *Pers., Syn. Pl.*, i. p. 497 (1805); *Reichb., Ic. Pl. Crit.*, 263; *Rohrb., Monogr.*, p. 190.

Adde syn. S. fruticulosa, *Bieb. Tabl.*, n. 17, *ex DC. Prodr.*, i. p. 381.

This plant is frequently cited as *S. suffrutescens* Bieb., *e.g.*, by Ledebour (*Fl. Rossica*) and Boissier (*Fl. Orient.*), though that name is three years later.

Geogr. limits.—*N.* N. Turkestan.
S. E. shore of the Caspian Sea.
E. Desert of Soungaria.
W. Between Kuba and Schamachi, in the Eastern Caucasus (*S. fruticulosa*).

293. S. HIRTICALYX, *Boiss. et Haussk. in Boiss., Fl. Orient., suppl.*, p. 104.

Glauca, glabra. Caules e rhizomate indurato adscendentes, inferne dichotome et pluries ramosi, inter internodia brevia nodoso-incrassati, apice 1–2-flori. Folia inferiora anguste oblongo-lanceolata, obtusa, basi longe attenuata, superiora abbreviata, acuta. Pedicelli calyce 5-plo breviores. Calyx cylindricus, pilis crispulis velutinus, fructifer clavatus, nervis pallidis, dentibus ovatis late membranaceis. Petala fuscescentia, biloba, appendicibus circumcircâ denticulatis. Capsula oblonga carpophoro sublongior.

Hab. On mountains of Persian Kurdistan, above Inanro.

†† Petala linearia integra.

294. S. LEPTOPETALA, *Schrenk, in Bull. Phys. Math. Acad. Pétersb.*, ii. p. 198; *Rohrb., Monogr.*, p. 191.

Hab. Soungaria.

β. Calyx membranaceus.

† Petala unguibus ciliatis.

295. S. PETRÆA, *Adams in Weber et Mohr, Beitr.*, i. (1805) p. 58; *Rohrb., Monogr.*, p. 191.

β. GYMNOCALYCINA, *Trautv. in Act. Hort. Petrop.*, v. pars II. p. 414.

Geogr. limits.—*N.* R. Terek, in prov. of Cis-Caucasia, near Wladikawkas.
S. and *E.* W. Tibet.
W. Central Caucasus.

295. SILENE LINEATA, *Boiss. et Buhse, Aufz. Transkauk. Pers.*, p. 37 (1860); *Rohrb., Monogr.*, p. 191.

Facies et inflorescentia formarum normalium *S. tenuis*; hæc autem calyce longo gracili cylindrico, pedicellis medium versus bracteolatis differt.

Hab. N.-W. Persia.

†† Petala unguibus glabris.

297. S. MONTBRETIANA, *Boiss., Diagn. Pl. Nov. Or.*, Ser. I. i. p. 26; *Rohrb., Monogr.*, p. 192.

Habitus et flores abbreviati *S. pruinosæ*, sed inflorescentia non paniculata.

β. ANISOLOBA, *Schrenk*, (sp.) *in Bull. Phys. Math. Acad. Pétersb.*, ii. p. 198; *Rohrb., Monogr.*, p. 196.

Magis suffruticosa, minus pubescens; calycis dentes ovati.

Trautvetter, in examining Schrenk's specimens, was unable to find any traces of lateral lobes in the limb of the petals, which appeared to be bifid like those of *S. Montbretiana.* He thinks, therefore, that it might be referred to *S. longiflora*, as a suffruticose and narrow-leaved form of that species (*Bull. Soc. Nat. Mosc.*, 1860, p. 153). There are no specimens in Herb. Kew.

γ. MICROPHYLLA, *Boiss., Fl. Orient., suppl.*, p. 98.

Folia minuta, infina spathulata, suprema angustissima, acuta recurva; calyx densissime pubescens, fructifer minus clavatus.

Hab. Aïn-Tab, in prov. of Aleppo (*Haussknecht*).

Geogr. limits.—*N.* Gumuchkhane, in prov. of Trebizond, Turkey in Asia.
S. Aïn-Tab, in prov. of Aleppo (*var. γ*).
E. Valleys of the Ala-tau range, in Soungaria (*var. β*).
W. Mt. Ak-dagh, in prov. of Siwas.

298. S. BRAHUICA, *Boiss., Fl. Orient.*, i. p. 615; *Rohrb., Monogr.*, p. 192.

Hab. Choky, in Afghanistan, and Doubund, in Beloochistan.

299. SILENE URVILLEI, *Schott, ex Urv. in Mém. Soc. Linn. Par.*, i. (1822) p. 304; *Rohrb., Monogr.*, p. 192.

Adde: Nervi calycini purpurei; semina dorso canaliculata, faciebus plana.

Hab. Anatolia; Mt. Sipuli-dagh, and Island of Cos, off the S.W. coast, also Island of Samos (Herb. Kew., *Major*, 1886).

c. Capsula carpophorum bis terve superans, vel subsessilis.

α. Folia pungentia; semina dorso faciebusque plana.

300. S. ALTAÏCA, *Pers., Syn. Pl.*, i. p. 497 (1805); *Ledeb., Pl. Fl. Rossicæ*, t. 172; *Rohrb., Monogr.*, p. 193.

Hab. Asiatic Russia.—*N.* Kirghiz Steppes.
E. Altaï Mtns.
S. Desert of Soungaria.
W. R. Ural.

β. Folia mutica; semina dorso canaliculata, faciebus plana.

† Calyx glaberrimus.

301. S. LITHOPHILA, *Kar. et Kir. in Bull. Soc. Nat. Mosc.*, xv. (1842) p. 167; *Rohrb., Monogr.*, p. 193.

Habitu *S. altaïcæ* similis, sed carpophorum glabrum, petala bipartita (nec bifida) ecoronata, semina dorso canaliculata.

Hab. Soungaria.

302. S. TENELLA, *C. A. Mey., Verz. Pfl. Cauc.*, p. 216 (1831); *Rohrb., Monogr.*, p. 194.

Hab. Prov. of Talysch in Trans-Caucasia, and Mt. Ararat in Turkish Armenia.

†† Calyx pubescens.

1. Ungues et filamenta glabra.

303. S. CANARIENSIS, *Willd. in Spreng. Neue Entd.*, iii. p. 60; *Rohrb., Monogr.*, p. 194.

Hæc vera *S. canariensis*: planta perennis floribus racemosis. Species annua inflorescentiâ scorpioideâ, quæ ab Otth, in DC. Prodr., i. p. 372, sub hoc nomine edita et in Phytogr. Canar., i. p. 142, t. 18, depicta est, huc non pertinet, sed = *S. mogadorensis*, Coss. et Bal. in Pl. Marocc. exsicc. (1867).

Hab. Teneriffe.

304. SILENE NOCTEOLENS, *Webb et Berth.*, *Phytogr. Canar.*, i. p. 141, t. 20; *Rohrb.*, *Monogr.*, p. 194.

Adde: Semina dorso obtuse canaliculata (*ex observ.*).

Hab. Canary Isles.

2. Ungues et filamenta ciliati.

305. S. STENOBOTRYS, *Boiss. et Haussk. in Boiss.*, *Fl. Orient.*, i. p. 611, *et suppl.*, p. 97; *Rohrb.*, *Monogr.*, p. 195.

A *S. spergulifoliâ* et affinibus, staminibus hirsutis longe exsertis, discedens.

Adde syn. S. supina, *Aucher-Eloy*, n. 482.

Geogr. area.—Turkey in Asia.

W. Rascheya, in the Anti-Lebanon.

N. Prov. of Diarbekir, along the east branch of R. Euphrates (*Sintenis*, *It. Orientale*, 1888; Herb. Kew).

E. At the base of Mt. Sindjar, in prov. of Mosoul (*Haussknecht in Boiss.*, *Fl. Orient.*, *suppl.*, p. 97).

S. Mar Elias, between Damascus and the ruins of Palmyra, in the Syrian Desert.

306. S. SEMENOVII, *Regel et Herder*, *in Bull. Soc. Nat. Mosc.* (1866), p. 536; *Rohrb.*, *Monogr.*, p. 195.

Hab. Soungaria; the Ala-tau Range, north of the R. Tabya and Lake Issyk-kul.

B. Petala laciniato-quadripartita.

307. S. ODORATISSIMA, *Bunge in Ledeb.*, *Fl. Altaïc.*, ii. p. 148; *Ic. Fl. Rossicæ*, t. 396 (petala erronea); *Rohrb.*, *Monogr.*, p. 195.

Hab. Kirghiz Steppes and Desert of Soungaria.

b. Flores in racemo simplici vel composito verticillastrifero, aut, axis primariæ internodiis intra inflorescentiam abbreviatis, capitulum plus minus densum formantes; (rarissime racemus non contractus pauciflorus, sed tum calyx brevis obconicus et ungues ciliati).

Series 4. *Capitellatæ.*

Flores in racemo simplici, axis primariæ internodiis abbreviatis, capituliformi, rarissime in racemo paucifloro non contracto: calyx brevis turbinatus vel oblongo-campanulatus, evenius; ungues ciliati.

A. Petala unguibus auriculatis.

308. Silene Aristidis, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 330 (1874); *Battand. et Trabut, Fl. Algér.*, 140; *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 150, t. 97.

Basi suffruticosa. Caules erecti vel arcuato-adscendentes, glabrescentes, floriferi dichotome ramosi. Folia glabra vel inferiora basi tantum breviter ciliata, obvato - oblonga, breviter apiculata, in petiolum plus minus latum attenuata; bracteæ lineari-lanceolatæ, superiores pubescenti-glandulosæ. Flores breviter pedicellati. Calyx 20 mm. longus, pubescenti-glandulosus tubulosus, fructifer superne oblongo-dilatatus infra capsulam contractus, albido-membranaceus, nervis virentibus, dentibus triangulari-lanceolatis, acutis, albo-marginatis, ciliolatis. Petala, unguibus exsertis obtuse auriculatis, intus albida, extus lutescentia, laminâ oblongo-cuneatâ bilobâ, appendicibus binis oblongo-lanceolatis acutis interdum dentatis. Filamenta glabra. Capsula superne paullulum attenuata, carpophorum bis superans. Semina compressa, dorso lato plano, tuberculis seriatim echinulato, faciebus concavis striatis.

S. fruticosa habitu notisque plurimis necnon seminum fabricâ cum *S. Aristidis* congruit et tantum distinguenda floribus minus confertis, petalorum laminâ purpurascente, unguibus edentulis, stipite capsulæ subæquilongo vel paullo breviore.

Hab. Algeria (*Letourneux*, 1874).

309. S. citrina, *Boiss., Fl. Orient., suppl.*, p. 101.

Cæspitosa breviter tomentella, pallide virens. Caules erecti, simplices, foliosi. Folia radicalia late lanceolato-linearia, acuminata, in petiolum longum attenuata, caulina abbreviata, sessilia subamplexicaulia; bracteæ subulatæ. Calyx ampliato-ovatus, fructifer sub capsulâ vix constrictus, glanduloso-pubescens, umbilicatus, dentibus lanceolatis acuminatis. Petala citrina, biloba, parva, unguibus exsertis, appendicibus binis ovatis. Capsula ovata carpophoro sublongior. Semina granulata.

Facies *Melandrii Requieni*, sed caules non extrarosulares, et rudimenta dissepimentorum in capsulâ videri possunt.

Syn. Melandrium cabulicum, *Boiss., Diagn.*, Ser. II. i. p. 79.

Lychnis cabulica, Aitch. in Journ. Linn. Soc. (Bot.), xix. (1882) p. 153, is a very different plant.

Hab. Shendtoi, in Afghanistan (*Aitchison*).

B. Petala unguibus edentulis.

a. Petala bipartita.

† Filamenta glabra.

310. SILENE PHARNACEIFOLIA, *Fenzl, Pugill. Fl. Nov. Syr.*, p. 26 (1842); *Russegg., Ill. Pl. Taur.*, t. 10; *Rohrb., Monogr.*, p. 196.

Hab. Mt. Lebanon, above Adros (*Peyron, ex Boiss., Fl. Orient., suppl.*, p. 97); and Mt. Taurus, in Cilicia.

311. S. CEPHALANTHA, *Boiss., Fl. Orient.*, i. p. 613; *Rohrb., Monogr.*, p. 197.

Differt a formis *S. spergulifoliæ, Bieb.*, calyce eglanduloso, unguibus ciliatis, superne non dilatatis; a *S. Montbretianâ*, Boiss., cujus formis paucifloris habitu valde accedit, striis calycinis superne tantum conjunctis, unguibus ciliatis edentulis, carpophoro breviore.

Hab. Palanteuken, in Turkish Armenia.

312. S. DIANTHOIDES, *Pers., Syn. Pl.*, i. p. 500 (1805); *Schreber, Dec.* (1766), p. 9, t. 5 (Cucubalus saxifragus, *Linn.*); *Rohrb., Monogr.*, p. 197.

Species habitu generis *Gypsophilæ*.

a. TYPICA, *Trautv. in Act. Hort. Petrop.*, ii. (1873) p. 511.

Caulis basi foliaque dense et brevissime puberula.

β. GLABRATA, *l.c.*

Caulis glaberrimus; folia basi breviter ciliata, ceterum glaberrima.

Geogr. area.—Asia Minor.

S. Mt. Jokardi-dagh, near Egin, in prov. of Siwas (*Sintenis, It. Orientale* [1890], n. 2497).

N. and *E.* District of Kara-bagh, in prov. of Trans-Caucasia.

W. The hills above Gumuchkhane, in prov. of Trebizond.

††. Filamenta ciliata.

313. SILENE ROEMERI, *Friw. in Flora*, xix. (1836) p. 439; *Rohrb.*, *Monogr.*, p. 198.

According to E. Tanfani, the petals are bigibbous, and the filaments ciliate.

Geogr. limits.—*N.* Near Carlova, in N. Bulgaria.
S. Mt. Pindus, in Thessaly, Greece (*Haussknecht, in Mittheil. Thüring. Bot. Ver.*, Heft v. (1893) p. 50).
E. E. Rumelia (*Skorpil*, 1886, *ex Nym.*, *Consp. Fl. Eur.*, *suppl.*, ii. p. 53).
W. Prov. of Abruzzi, Central Italy.

314. S. OLYMPICA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 24 (1842); *Rohrb.*, *Monogr.*, p. 198.

α. GLABRATA, *mihi.*

Folia radicalia scabrido-ciliolata, ceterum glabra. Racemus spiciformis. Calyx 5 mm. longus. Petalorum appendices bini, breves, ovati.

β. PUBESCENS, *Boiss.*, *Fl. Orient*, i. p. 610.

Folia radicalia undique tomentella. Racemus longior, laxior. Calyx 8 mm. longus. Petalorum appendices interdum obsoleti.

γ. CALYCULATA, *C. Koch*, (sp.) *in Linnæa*, xix. (1847) p. 56.

Folia angustiora. Racemus laxus. Petala bigibba, lobis linearibus, appendicibus ad gibbos reductis.

Speciei formæ capituliformes a *S. capitellatâ* petalis bifidis statim dignoscendæ.

Geogr. limits.—*N.* Prov. of Kara-bagh, in the Caucasus (*var. γ*).
S. Mt. Taurus, in Cilicia.
E. Mt. Elburz, in N. Persia, above Warahosul (*var. γ*).
W. Mt. Kheshish-dagh (Bithynian Olympus).

β. Petala integra lineari-spathulata.

315. S. CAPITELLATA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 25; *Rohrb.*, *Monogr.*, p. 199.

Differt a priori, petalis integris, filamentis glabris; a proximâ, floribus dimidio minoribus hermaphroditis, petalis minus exsertis, unguibus ciliatis.

Geogr. limits.—Turkey in Asia.
S. Prov. of Marasch.
N. and *E.* Turkish Armenia; between Erzeroum and Ispir.
W. Anatolia; Mt. Davros-dagh.

Series 5. *Otiteæ.*

Flores in racemis simplicibus compositisve verticillastriferis; pedicelli imâ basi binis prophyllis præditi.

A. Petala integra raro leviter emarginata, ecoronata.

a. Capsula sessilis.

316. SILENE SENDTNERI, *Boiss.*, *Fl. Orient.*, i. p. 608; *Rohrb.*, *Monogr.*, p. 199.

A formis *S. Otitis* imprimis differt petalis latis calyce duplo longioribus.

Geogr. limits.—*N.* and *W.* Near Fuzine, in Croatia (S. Schlosseri, *Vukot.* [1876]).
S. and *E.* Mt. Vitosa, in Bulgaria, *Velenovsky* (1890).

Adde syn. S. Schlosseri, *Vukot. in Oesterr. Bot. Zeitschr.*, xxx. (1880) p. 382.

317. S. OTITES, *Sm.*, *Fl. Brit.*, ii. p. 469; *ex Comp.*, *Fl. Brit.*, p. 65 (1800); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5094; *Rohrb.*, *Monogr.*, p. 199.

1. Racemi simplices verticillastriferi aut rami primarii inferiores paullum elongati; flores dioici aut polygami.

α. GENUINA; *Linn.*, *Sp. Plant.*, ed. I. p. 415 (Cucubalus Otites); *Syme*, *Engl. Bot.*, ed. III. ii. p. 63, t. 206; *Rohrb.*, *Monogr.*, p. 200.

Folia inferiora spathulato-lanceolata, puberula vel obovato-oblonga, canescentia; pedicelli calycesque glabri; petala glabra, raro basi ciliolata.

Lusus 2. Folia supra glabrata, subcoriacea, in caule mox diminuta. Capsula ovato-elliptica, 6–7 mm. longa.

Syn. S. Otites, *var.* duriuscula, *Velen. in Sitzungsb. k. Böhm. Ges. Wiss.* (1893), p. 13 (sep.).
S. pseudotites, *Rota*, *Prosp. Piant. Svizz. Ins.*, p. 47.

β. PARVIFLORA, *Rohrb.*, *Monogr.*, p. 200; *Ehrh.*, *Beitr.*, vii.

p. 143 (Cucubalus parviflorus); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5096.

Folia lineari-spathulata, pedicelli calycesque scabri; petala basi ciliata.

γ. HELLMANNI, *Rohrb.*, *Monogr.*, p. 183; *Claus*, (sp.) *Beitr. Pflanzenk. Russisch. Reichs*, (1851) p. 289; *Trautv. in Act. Hort. Petrop.*, ii. (1873) p. 508.

Humilis, depauperata. Caulis, pedicelli et calyces tenuissime puberuli. Folia inferiora obovato-spathulata, superiora angustiora vel linearia; bracteæ subulatæ. Capsula major.

2. Racemi effusi ramis elongatis verticillastriferis; flores polygami; pedicelli glabri.

δ. WOLGENSIS, *Rohrb.*, *Monogr.*, p. 201; *Willd.*, *Enum. Hort. Berol.*, *suppl.*, p. 24 (1813) (Cucubalus wolgensis); *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5095.

Caulis inferne retrorsum puberulus; folia lineari-spathulata scabriuscula; verticillastra laxa; calyx glaber, abbreviatus.

ε. DENSIFLORA, *Rohrb.*, *Monogr.*, p. 201; *Urv.* (sp.) *in Mém. Soc. Linn. Par.*, i. (1822) p. 303.

Caulis elatus, crassus, cum foliis dense molliter villosus, superne glaber, viscidus; folia ovato- vel oblongo-spathulata, interdum undulata, rarius lineari-lanceolata, acutiuscula; verticillastra dense congesta; calyx 5–6 mm. longus, glaber; semina majora.

Rohrbach does not record the occurrence of this species so far west as Spain; and, on the other hand, it is not found so far south as Syria, as mentioned in vol. i. of *DC. Prodromus*. In this latter case "Syriaca" is an obvious error for "Piriac," a locality on the west coast of France. The original reference for Smith's name is seldom given correctly. It is generally cited as vol. ii. p. 469, though there is no necessity to specify the volume. Rohrbach cites vol. ii, p. 298, but this volume and page refers to Smith's 'English Flora.'

Geogr. limits.—*N.* and *E.* Siberia.
S. Elmalu, in Anatolia (*var.* densiflora *forma* stenophylla).
W. Salamanca, in prov. of Leon, Spain (*Quer*, *ex Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 664).

b. Capsula carpophorum bis-quater superans vel fere æquans.

318. SILENE ANDRYALÆFOLIA, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 331 (1874).

Cæspitosa, glauca, pubescens. Caulis simplex, rectus vel adscendens, velutino-pubescens, foliosus, multiflorus, non viscidus. Folia inferiora conferta, spathulato-lanceolata, in petiolum longum attenuata, tomentosa, acuta vel subacuminata, superiora lanceolato-linearia vel spathulata; bracteæ parvæ, scariosæ. Flores erecti, breviter pedicellati, in paniculis trichotomis corymbiformibus dispositi. Calyx tenuiter cylindricus, glanduloso-pubescens, fructifer superne obconico-ovoideus, inferne clavæformis, nervis angustis reticuloso-anastomosantibus, dentibus oblongis, obtusis, rotundatis, late scariosis. Petala ochroleuca, unguibus glabris. Filamenta glabra. Capsula ovoideo-conica, carpophoro pubescente. Semina fusca, faciebus concaviuscula, striata, dorso plana vel compressiuscula, seriatim tuberculata.

Hab. Djurdjura, in Algeria.

319. S. HOLOPETALA, *Bunge in Ledeb., Fl. Altaïca*, ii. p. 142; *Ic. Pl. Fl. Rossic.*, 163; *Rohrb., Monogr.*, p. 202.

Hab. Desert of Soungaria.

320. S. SIBIRICA, *Pers., Syn. Pl.*, i. p. 497 (1805); *Rohrb., Monogr.*, p. 202.

Geogr. limits.—*S.* The stream of Kantschahar, in the desert of Chinese Soungaria.
N. and *E.* Between the rivers Olenek and Lena, in Arctic Siberia (*Czekanowski* [1875]).
W. W. Russia; province of Podolia.

321. S. FALCONERIANA, *Royle, Illustr. Pl. Himal.*, p. 79, t. 20 A; *Rohrb., Monogr.*, p. 202.

Adde: Calyx basi truncatus; petala alba.

Hab. N.-W. Himalayas.

322. S. GEBLERIANA, *Schrenk, Enum. Pl. Nov.*, p. 91; *Rohrb., Monogr.*, p. 203.

Planta *S. sibiricæ* similis, sed calycibus cum carpophoro pubescente elongatis ab illâ satis distincta; a *S. multiflorâ* petalis diversa; *S. Falconerianæ* valde affinis sed statim distinguenda.

Hab. R. Urdschar, in the desert of Soungaria; valleys north of the Thian-Schan Range (*Ruprecht, ex Mém. Acad. Sc. St. Pétersb.*, xiv. [1869]); Unzere Boratola (*Regel, It. Turkestan.*, viii.).

B. Petala bipartita.

a. Capsula carpophorum subæquans.

323. SILENE MULTIFLORA, *Pers., Syn. Pl.*, i. p. 496 (1805); *Waldst. et Kit., Pl. Rar. Hung.*, i. t. 56 (Cucubalus multiflorus); *Rohrb., Monogr.*, p. 203.

Geogr. limits.—*N.* Near Semipalatinsk, on the R. Irtysch, Siberia.
S. The Dobrudscha, in Roumania (*Kanitz, Pl. Roman., suppl.*, p. 182 [1881]).
E. Desert of Soungaria.
W. Neusiedler See, in Hungary.

324. S. CEPHALENIA, *Heldr., Fl. Cephalon.*, p. 26 (1883); *Boiss., Fl. Orient., suppl.*, p. 106.

Inferne pube asperulâ canescens. Caules adscendentes, superne viscidi, laxe racemoso-paniculati. Folia inferiora conferta spathulata acuta, superiora admodum diminuta linearia. Ramuli paniculæ patentes, apice pauciflori; flores breviter pedicellati secundi, pedicellis fructiferis cernuis. Calyx cylindrico-clavatus glanduloso-pubescens, dentibus triangularibus, acutis, albo-marginatis. Petala livida, ecoronata, lobis linearibus. Semina rugulosa dorso canaliculata.

Affinis facie *S. congestæ* a quâ differt pube asperulâ, inflorescentiâ laxiore, foliis acutis, calycis dentibus acutis, carpophoro capsulam æquante.

Hab. Ionian Islands; Cephalonia (*Heldreich* [1872]).

b. Capsula carpophorum 3–4-plo excedens.

325. S. GIGANTEA, *Linn., Sp. Plant.*, ed. I. p. 418, et (accuratius) in ed. II. p. 598; *Sibth. et Sm., Fl. Græca*, v. t. 432; *Rohrb., Monogr.*, p. 203.

β. VIRIDESCENS, *Boiss., Fl. Orient.*, i. p. 646.

Viridescens, indumento parciore. Panicula viscosissima; cymæ plus minus effusæ nec confertim floriferæ.

Geogr. limits.—*N.* Rumelia.
W. Ionian Islands; Zante.
E. Mt. Gaiour-dagh, in prov. of Aleppo (*Post, ex Bull. Herb. Boiss.*, iii. [1895] p. 154).
S. Broummana, in the Lebanon (*var. β*).

326. SILENE CONGESTA, *Sibth. et Sm.*, *Prodr. Fl. Græc.*, i. p. 300; *Rohrb.*, *Monogr.*, p. 204.

Geogr. limits.—*N.* Thessaly (*Haussknecht, ex Nym.*, *Consp. Fl. Eur.*, *suppl.*, ii. p. 52).
S. Mt. Taygetos, in the nome of Laconia, Morea (*Haussknecht, l.c.*).
E. Mt. Parnassus, in the nome of Attica, Livadia.
W. Mt. Kyllenes, in the nome of Arcadia (*Heldreich, ex Boiss.*, *Fl. Orient.*, *suppl.*, p. 106).

327. S. BRIDGESI, *Rohrb. in App. II. Ind. Sem. Hort. Berol.* (1867) p. 5; *Monogr.*, p. 204.

Adde: Petala alba vel purpurascentia, unguibus anguste auriculatis.

Syn. S. incompta, *A. Gray, in Proc. Amer. Acad.*, vii. (1868) p. 330; *vide B. L. Robinson, l.c.*, xxviii. (1893) p. 139.
S. Engelmanni, *Rohrb. in App. II. Ind. Sem. Hort. Berol.* (1867), p. 5; *Monogr.*, p. 213.
S. multicaulis, *Durand, in Journ. Acad. Nat. Sc. Philad.* (1855); *ex S. Wats.*, *Bibl. Ind.*, p. 108.

Hab. California.

328. S. YUNNANENSIS, *Franch. in Bull. Soc. Bot. France*, xxxiii. (1886) p. 425.

E basi ramosa, undique tenuissime pubescens, glauca. Rami erecti, rigidi, ultra medium crebre foliati. Folia e basi breviter attenuata, anguste lanceolata, acuminata, 3-nervia, nervis lateralibus marginantibus, supra asperulata, infra dense puberula. Inflorescentia paniculato-corymbosa, in cymas 2–3-floras congestas disposita; pedicellis abbreviatis. Calyx tubuloso-clavatus, apice parum constrictus, inferne vix angustatus, præsertim ad nervos purpurascentes pilis crispis vestitus, dentibus ovato-triangularibus acutis, Petala rosea, lamina late

obcordata, lobis latis ovatis, cum dente vel lobulo laterali, appendicibus oblongis. Filamenta glabra. Capsula oblonga.

Habitus *S. repentis* in formâ autem petalorum diversa, etiam dispositione bractearum in pedicellis.

Characters verified from authentic specimens in Herb. Kew.

Hab. China; prov. of Yun-nan.

Series 6. *Spergulifoliæ.*

Flores in racemis simplicibus sive compositis, verticillastra plus minus densa, interdum pauciflora ferentibus: pedicelli medio seu apice binis prophyllis præditi.

A. Petala multifida, lobis lateralibus brevibus.

329. SILENE PACHYRRHIZA, *Franch. in Bull. Soc. Bot. France*, xxxiii. (1886) p. 427.

Caules e radice crassâ, debiles, erecti, puberulo-scabri ad apicem usque foliosi. Folia oblongo-lanceolata, breviter petiolata, scabra, caulina mox decrescentia. Inflorescentia obligantha, floribus 3–4; bracteæ minutæ, acuminatæ; pedicelli dense puberuli. Calyx tubuloso-campanulatus, umbilicatus, inferne parum angustatus, pilis brevissimis obsessus, dentibus ovatis, acutis. Petala rosea, unguibus auriculatis, glabris, lobis lateralibus triangularibus, lobis mediis linearibus, appendicibus oblongis. Filamenta glabra. Capsula ovato-conica.

Characters verified, as in the preceding, from specimens in Herb. Kew.

Hab. China; prov. of Yun-nan.

330. S. OLGÆ, *Rohrb. in Linnæa*, xxxvi. (1870) p. 687; *Maxim. in Bull. Acad. Imp. Sc. Pétersb.*, vii. (1865) p. 332 (Melandrium Olgæ).

Caules erecti, solitarii vel plurimi, simplices vel paullum stricte ramosi, pilis crispis viscidis dense vestiti, 10–30 centim. longi. Folia lanceolata vel ovato-lanceolata acuminata, basi paullum angustata, hirtella, margine pilis longis ciliata, superiora et bracteæ pedunculorum medium versus sessiles sensim angustiores ac minores. Racemi rami 1–3-vel rarius pluriflori, calyce brevius pedunculati, pedunculis dense viscido-pubescentibus. Calyx 8–10 mm. longus, sæpe rubescens, turbinato-oblongus, fructifer ampliatus ovatus, pilis viscidis dense vestitus, striis viridibus vel nigricanti-rubellis superne arcuatim conjunctis et intra dentes reticulato-venosis, dentibus elongato-lanceolatis, acuminatis albo-marginatis, ciliatis. Petala purpurea vel sordide rubro-violacea, unguibus exsertis, longe ciliatis, lobis medianis oblongis, lateralibus lacinulatis, appendicibus binis fornicatis elongato-lanceolatis. Filamenta glabra. Capsula ovato-oblonga, subsessilis. Semina reniformia, dorso faciebusque plana dense acute tuberculata.

Hab. S.E. Siberia; on the shores of the bay of St. Olga and near the R. Waï-Fudin.

B. Petala bipartita vel bifida.

a. Capsula carpophorum æquans vel fere bis superans.

331. SILENE REPENS, *Patr. in Pers. Syn. Pl.*, i. p. 500; *Ledeb., Ic. Fl. Rossic.*, t. 425; *Rohrb., Monogr.*, p. 206.

a. ANGUSTIFOLIA (typica), *Turcz. ap. Regel, in Bull. Soc. Nat. Mosc.* (1861) p. 561.

Folia linearia vel anguste lineari-lanceolata, 1½–6 mm. lata.

f. SINENSIS, *mihi* (= S. repens, *Franch. in Journ. Botanique*, [1890], p. 302).

Folia scabridiora quam in speciminibus Sibiricis. Petalorum appendices lineares, paullum divergentes. Carpophorum velutinum.

Hab. N. China; Suen-hoa-fou.

β. LATIFOLIA, *Turcz. ap. Regel in Bull. Soc. Nat. Mosc.* (1861) p. 561.

Folia lineari-lanceolata vel anguste lanceolata, 6–12 mm. lata.

γ. TRANSCAUCASICA, *Trautv. in Act. Hort. Petrop.*, ii. (1873) p. 508.

Caules simplicissimi; foliorum fasciculis vel ramulis foliiferis in foliorum caulinorum axillis plane deficientibus.

Geogr. limits.—*N.* and *E.* Kamtschatka, in Siberia.
W. Slatoust, in Central Russia.
S. Japan.

332. S. SPERGULIFOLIA, *Bieb., Fl. Taur. Cauc.*, iii. (1819) p. 305; *Reichb., Ic. Fl. Germ. Helv.*, n. 5101; *Rohrb., Monogr.*, p. 206.

Syn. S. spergulifolia *var.* clavata, *Trautv. in Act. Hort. Petrop.*, ii. (1873) p. 508.

Lusus 2. Calyx fructifer brevior, ob carpophorum brevissimum ellipsoideus.

Syn. S. spergulifolia, *var.* ellipsoidea, *Trautv. in Act. Hort. Petrop.*, ii. (1873) p. 508.

Lusus 3. Caules debiles, geniculati, glabriusculi; inflorescentiæ rami primarii elongati.

Syn. S. spergulifolia, *var.* elongata, *Boiss.*, *Fl. Orient.*, i. p. 612.

β. ARBUSCULA, *Boiss.*, *l.c.*

Dumosa, caudice lignoso. Folia lineari-lanceolata. Racemus elongatus. Calyx solùm ad strias hirsutus.

Geogr. limits.—*N.* Trans-Caucasia.
S. and *E.* Persia; Ruins of Persepolis, in prov. of Fars (*var. β*).
W. Mt. Arjish-tagh, in prov. of Karamania.

333. SILENE BORNMUELLERI, *Freyn, in Oesterr. Bot. Zeitsch.* xli. (1891) p. 363.

Tota glanduloso-hirta, viscosa, e basi suffrutescente multicaulis. Caulis infra foliorum rosulam terminalem lateraliter edens. Caules stricte erecti, apice 1–3-flori. Folia lanceolata, acuta, infima subspathulata, caulina vix diminuta, floralia herbacea, conspicue minora. Calyx florum masculorum major, cylindrico-conicus, rubro-striatus, apice purpureus, dentibus ovatis obtusis; florum feminorum et florum hermaphroditorum minor, subturbinatus, viridi- vel purpureo-striatus, dentibus oblongis, obtusis, margine subhyalinis. Petala alba, unguibus ciliatis, lobis oblongis, appendicibus binis, oblique ovatis, acutis, denticulatis. Capsula (perjuvenilis) turbinata, carpophoro glabro duplo saltim longiore suffulta.

Hab. Prov. of Siwas; Mt. Yildiz-dagh (*Bornmueller*, exs., n. 2022).

β. SUBALPINA, *Freyn*, *l.c.*

Elatior, vegetior, subpedalis, laxe paniculata, paniculæ ramis paucis, apice cymoso-trifloris, inferioribus divaricatis vel arrectis, foliis majoribus.

Hab. Mt. Yildiz-dagh (*Bornmueller*, exs., n. 2023).

334. S. SUPINA, *Bieb.*, *Fl. Taur. Cauc.*, i. p. 336, iii. p. 304; *Bot. Mag.*, t. 1997; *Rohrb.*, *Monogr.*, p. 207.

Geogr. limits.—*N.* and *E.* Altaï Mtns., in Siberia.
S. Prov. of Ghilân, N. Persia.
W. Bulgaria; nr. Varna (*Bornmueller*, Pl. exs. Bulgariæ Or. [1889], n. 3).

b. Capsula subsessilis: flores dioici.

335. SILENE PRUINOSA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 23, et viii. p. 85; *Rohrb.*, *Monogr.*, p. 208 (S. supina *var.* pruinosa).

Tota grisea, retrorsum tomentella, e basi suffrutescente multicaulis. Caules adscendentes paniculati, paniculæ ramis sæpius alternis. Folia brevia, lanceolato-linearia, acuta, subspathulata. Calyx glanduloso-hirsutus, cylindrico-conicus, fructifer clavatus, infra capsulam leviter constrictus, nervis anastomosantibus, hispidulis, dentibus ovatis, obtusis, albomarginatis, ciliatis. Petala alba, unguibus ciliatis inclusis, bifida lobis linearibus, appendicibus binis, parvis, ovatis, obtusis. Capsula oblongo-conica. Semina globosa, dorso lato convexa, faciebus plana.

Species polymorpha, affinis *S. spergulifoliæ*, a quâ tamen sat differre videtur indumento, foliorum formâ, inflorescentiâ ramosiori paniculatâ, ramis sæpius alternis; occurrunt tamen formæ subracemosæ. Hanc ut varietatem *S. supinæ* Rohrbach habet, sed secus Boissier et suo sensu erronée; etenim hæc floribus saltem duplo longioribus a *S. pruinosa* distinguitur. Specimina armena ex Gumuschkhané *S. pruinosæ* sistunt ex Rohrbach speciem propriam *S. armeniaca* Rohrb., sed a typo tantum differunt carpophoro paullulum breviore et transitus adsunt innumeri.

Syn. S. virgata, *Stapf*, *in Denkschr. Akad. Wien*, li. (1886) p. 283.

β. ALPINA, *Boiss.*, *Fl. Orient.*, i. p. 613.

Caules humiliores procumbentes pauciflori.

γ. ARMENIACA, *Rohrb.* (sp.) *in App. Alt. Ind. Hort. Berol.* (1867) p. 5.

Caules suberecti foliosi, basi magis cæspitosi.

Syn. S. pruinosa, *var.* fasciculata, *Boiss.*, herb.

Geogr. limits.—*N.* Gumuschkhané, in prov. of Trebizond, Armenia (*var. γ*).
S. Mt. Cassius, in prov. of Aleppo.
E. W. Persia (*Stapf*).
W. Prov. of Anatolia.

336. SILENE BRACHYCARPA, *Boiss. et Bal.*, *Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 29; *Rohrb.*, *Monogr.*, p. 208.

Inflorescentia *S. spergulifoliæ*, folia *S. pruinosæ*, ab utrâque distincta capsulâ globosâ sulcatâ, in rostrum pungens abrupte abeunti.

Hab. Provinces of Anatolia and Siwas.

337. S. CAPPADOCICA, *Boiss. et Heldr.*, *Diagn. Pl. Nov. Or.*, Ser. I. viii. p. 86; *Rohrb.*, *Monogr.*, p. 209 (S. argentea, *var.* cappadocica).

Hæc et *S. argentea* specifice non differre videntur, sed hocce nomen speciei cujus formæ plurimæ virides glabriusculæ sunt servendum esse videtur. *S. argentea* ergo = *S. cappadocica* var. *argentea.*

Calyx 6 mm. longus, in floribus femineis minor et magis clavatus; petala florum masculorum majora profundius bipartita.

Affinis *S. sibiricæ* quæ differt foliis latioribus, petalis indivisis, carpophoro elongato. A *S. spergulifoliâ* et affinibus, unguibus glabris non dilatatis, floribus minoribus, calyce non glanduloso semper distinguenda.

β. ARGENTEA, *Ledeb.* (sp.), *Fl. Rossica*, i. p. 311.

Tota dense cano-velutina, sicut argentacea. Folia latiora. Calyx flavidus.

This plant is only briefly and insufficiently described by Ledebour, and its affinities with other species not satisfactorily made out and compared.

γ. GLANDULOSA, *Freyn, in Bornm.*, *Pl. Anatoliæ Orientalis* (1890), n. 71; *et in Bull. Herb. Boiss.*, iii. (1895) p. 78.

Stirps pilis reversis glandulosis, scabro-pubescens. Caules simplices vel infra medium subramosi. Folia spathulato-linearia. Calyx 8–9 mm. longus, scabro-pubescens glandulosus.

Hab. N. and *E.* Trans-Caucasia. *S.* and *W.* Anatolia.

c. Flores in racemo composito, ramis racemosis sive dichasia composita ferentibus, aut in racemo simplici ramis strictis uni-vel paucifloris elongatis; (rarissime in formis alpinis caulis uni-vel pauciflorus).

Series 7. *Lasiostemones.*

Flores erecti vel nutantes. Petalorum ungues et filamenta lanuginoso-ciliati.

a. Petala unguibus exauriculatis.

338. SILENE AFFGHANICA, *Rohrb. in App. Alt. Ind. Hort. Berol.* (1867), p. 5; *Rohrb., Monogr.*, p. 210.

Hab. Afghanistan.

339. S. PUBERULA, *Boiss., Fl. Orient.*, i. p. 636; *Rohrb., Monogr.*, p. 210.

Hab. Mt. Pir Omar Gudran, in Persian Kurdistan (*Haussknecht ex Boiss., Fl. Orient., suppl.*, p. 103); hills near Baïbout, in Turkish Armenia.

340. S. NIEDERI, *Heldr. in Boiss., Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 32; *Rohrb., Monogr.*, p. 211.

Ab affinibus coronâ subnullâ discrepans.

Hab. N. Greece (vide *Haussknecht, in Mittheil. Thüring. Bot. Ver.*, Heft v. [1893] p. 49).
E. Carpenisi, in the nome of Ætolia.
N. Peak of Zygos.
S. and *W.* Ionian Islands; vineyards in the Isle of Sta. Maura (*Baldacci*, n. 229, *ex Bull. Herb. Boiss.*, iv. p. 203 [Mars, 1896]); also Janina, in prov. of Epirus, Turkey (*Baldacci, in litt.*, July, 1896).

341. S. LONGIPETALA, *Vent., Pl. Jard. Cels*, t. 83; *Sibth. et Sm., Fl. Græca*, v. p. 13, t. 419; *Rohrb., Monogr.*, p. 211.

Adde: Petala alba vel purpurascentia, rarius ochroleuca.

Species ab affinibus radice repenti, paniculæ amplæ ramis longis divaricatis, distincta.

Adde syn. S. Ehrenbergiana, *Rohrb., Monogr.*, p. 163, n. 164.
S. chloropetala, *Rupr., Fl. Caucasi*, p. 195 (1869).

β. ASPERIFOLIA, *Freyn* (sp.), *in Bull. Herb. Boiss.*, iii. (1895) p. 97.

Folia tomentoso-aspera. Pedicelli stricti, ad medium bibracteati. Capsula oblonga.

Geogr. limits.—*N.* and *E.* Prov. of Daghestan, in Cis-Caucasia (S. chloropetala).
S. El Arish, on the coast of Egypt, near the frontier of Palestine (*Asch. et Schweinf. in Mém. Inst. Egypt.*, ii. [1889] p. 749).
W. Greece; Corinth (*Haussknecht, in Mittheil. Thüring. Bot. Ver.*, Heft v.).

342. SILENE KUNAWARENSIS, *Royle, Illustr. Bot. Himalay.*, p. 79; *Rohrb., Monogr.*, p. 211.

Adde: Caules puberuli vel glabri, tenues, foliis puberulis. Calyx umbilicatus.

Hab. W. Tibet; Kunawar in the Himalayas.

b. Petala unguibus auriculatis; flores nutantes.

a. Ungues dente obtuso auriculati.

343. S. MARSCHALLI, *C. A. Mey., Verz. Pfl. Cauc.*, p. 214 (1831); *Rohrb., Monogr.*, p. 212.

β. EUROPÆA, *mihi.*

Folia omnia anguste linearia glabra. Calyx glaber.

Syn. S. Guicciardii, *Boiss. et Heldr., Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 32.

Geogr. limits.—*N.* Eastern Caucasus.
S. Elmalu, in Anatolia.
E. N. Persia; Elburz Mtns., between Teheran and Tabreez.
W. N. Greece; slopes of Mt. Parnassus, above Livadi.

344. S. SAXATILIS, *Sims, Bot. Mag.*, t. 689; *Rohrb., Monogr.*, p. 212.

Differt a *S. nutante,* quâcum sæpe confusa fuerat, unguibus et filamentis ciliatis, capsulœ cum carpophoro proportione.

β. CONGESTA, *Boiss., Fl. Orient.*, i. p. 635.

Caules subsimplices; flores brevius pedicellati in 1–2 cymas fasciculiformes congesti.

γ DJIMILENSIS, *Boiss., Fl. Orient., suppl.*, p. 103.

Folia inferiora latiora; flores in cymas fasciculiformes breviter pedicellatas congesti.

δ. DAGHESTANICA, *Rupr.* (sp.) *Fl. Caucasi,* p. 194; *Boiss., Fl. Orient., suppl.*, p. 103.

Caules in parte inferiore laxius cæspitosi, intricati, crebrius foliati, axillis fasciculiferis. Folia abbreviata, lanceolato-spathulata, acuta, margine aculeolata. Panicula laxa, depauperata.

ε. ATROPURPUREA, *Rupr., Fl. Caucasi,* p. 193.

Petala atropurpurea.

Geogr. limits.—*N.* Prov. of Daghestan, in Cis-Caucasia (*var.* δ).
S. Mt. Elamut, in North Persia (*var.* α).
E. Russian Armenia (*var.* β).
W. Turkish Armenia; prov. of Trebizond.

345. SILENE APRICA, *Turcz. in Fisch. et Mey., Ind. Sem. Hort. Petrop.*, i. p. 38 (1835); *Turcz., Cat. Pl. Baïkal.*, n. 221, *in Bull. Soc. Nat. Mosc.* (1838) p. 88 (sensu limitato).

Caules stricti, erecti, simplices vel paullum stricte ramosi, inferne nodosi. Folia subcoriacea lanceolata, inferiora in petiolum attenuata, superiora linearia, omnia acuta, dense pubescentia. Flores in racemo valde elongato, ramis dichasia plus minus composita, verticillastra fingentia ferentibus, interdum elongatis. Bracteæ parvæ, villoso-ciliatæ, pedicellorum basi confertæ. Calyx breviter oblongus, fructifer infra capsulam leviter constrictus, basi sensim in petiolum attenuatus, dense incano-pubescens, striis viridibus quarum venæ paucæ conjunctæ, dentibus ovato-lanceolatis, acutis, albo-marginatis, ciliatis. Petala albida, vel rosea, laminâ parvâ bifidâ, lobis lineari-oblongis, unguibus inclusis, appendicibus parvis. Capsula oblonga, carpophorum 5–6-plo superans. Semina dorso faciebusque plana seriatim tuberculata.

α. TYPICA, *Rohrb. in Linnæa*, xxxvi. (1870) p. 685.

Caules folia et calyces plus minusve dense pubescentes.

Lusus 1. Caules incano-puberuli. Folia dense scabridulo-pubescentia. Flores in racemo valde elongato verticillastrifero, superne non raro in dichasium compositum mutato. Calyx 7–9 mm. longus, sub anthesi oblongus, fructifer subampliatus. Petala subinclusa.

Syn. Melandrium apricum, *Rohrb., Monogr.*, p. 231, *et in Linnæa*, xxxvi. (1869) p. 239.

Lusus 2. Caules dense molliter canescenti-pubescentes. Folia scabriuscula. Flores in dichasiis compositis, ramis florigeris infra inflorescentiam terminalem haud raro accedentibus. Calyx (5–6) 7–9 mm. longus, sub anthesi ovato-oblongus, fructifer ampliatus. Petala plus minus longe exserta.

Syn. S. Oldhamiana, *Miq., Annal. Mus. Lugd. Bat.*, iii. p. 187.
Melandrium Oldhamianum, *Rohrb., Monogr.*, p. 233, *et in Linnæa*, xxxvi. (1869) p. 241.

β. FIRMA, *Sieb. et Zucc.* (sp.) *in Abhandl. Münch. Akad.*, iv. II. p. 166.

Caules glaberrimi aut inferne pilis reversis leviter puberuli, nodis valde incrassati. Folia magis coriacea, inferiora sæpe late ovato-lanceolata, raro omnia late ovata, aut omnia glabra ac margine integra vel serrulato-ciliata, aut inferiora leviter pubescentia. Flores semper in racemo verticillastrifero raro paucifloro. Calyx glaberrimus 6–10 mm. longus.

Syn. S. firmula, *Herb. Lugd. Bat.*
S. melandriiformis, *Maxim.*, *Prim. Fl. Amur.*, p. 54 (1859).
Melandrium firmum, *Rohrb.*, *Monogr.*, p. 232.
Melandrium apricum, *var.* firmum, *Rohrb. in Linnæa*, xxxvi. (1869) p. 240.

Geogr. limits.—*N.* Lake Baïkal, in Siberia (the original specimens).
S. China; nr. Amoy, on the coast of prov. of Fo-kien (*var.* typica, lusus 2, *Herb. Hance*, n. 7410).
E. Japan; nr. Yokohama (*var.* typica, lusus 1, sed forma verticillastris plurifloris, *Wichura*, n. 1085).
W. Mongolia (*Kirilow*).

346. SILENE PRINGLEI, *S. Wats. in Proc. Amer. Acad.*, xxiii. (1888) p. 269; *B. L. Robinson, l.c.*, xxviii. (1893) p. 145.

Caules tenues, erecti, subglandulosi, scabrido-tormentosi. Folia lineari-lanceolata, acuminata, basi sensim attenuata, 3-nervia papilloso-scabra. Calyx cylindricus, umbilicatus, dentibus ovatis, fimbriato-ciliatis, reticulato-venosis. Petala fusco-purpurea, bipartita, appendicibus saccatis integris. Capsula oblongo-ovata. Semina granulata.

Hab. Arizona and New Mexico, in the United States, and Chihuahua, in North Mexico.

β. Ungues dente acuto auriculati.

347. S. SCOULERI, *Hook.*, *Fl. Bor.-Amer.*, i. p. 83 (1833); *Rohrb.*, *Monogr.*, p. 213.

Syn. S. Drummondii (non *Hook.*), *A. Gray, in Proc. Amer. Acad.*, viii. (1863).
Elisanthe Scouleri, *Rupr.*, *Fl. Caucasi*, p. 200 (1869).

β. COSTATA, *mihi*.

Hispido-pubescens. Folia carinata. Calyx oblongo-ovatus, nervis prominentibus.

Syn. S. Hallii, *S. Wats. in Proc. Amer. Acad.*, xxi. (1886) p. 446.

S. purpurata, *Greene, in Pittonia*, ii. (1891) p. 229; *et ex B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 141.

Geogr. limits.—*N.* and *W.* Vancouver Island, British North America.
S. and *E.* The Caucasus.

Series 8. *Nutantes.*

Flores nutantes. Ungues et filamenta glabri.

a. Calyx basi sensim in petiolum attenuatus.

348. SILENE LEUCOPHYLLA, *Boiss.*, *Diagn. Pl. Nov. Or.*, Ser. I. i. p. 29; *Rohrb.*, *Monogr.*, p. 214.

Hab. St. Catherine's Peak, on Mt. Sinai.

349. S. AMANA, *Boiss.*, *Fl. Orient.*, i. p. 634.

Facies et folia *S. viridifloræ* sed capsula stipitata.

Hab. Mt. Amanus, in prov. Aleppo, near Beilan.

350. S. VIRIDIFLORA, *Linn.*, *Sp. Plant.*, ed. II. p. 597; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5104 (non n. 5004); *Rohrb.*, *Monogr.*, p. 214.

Planta retrorsum glanduloso-pubescens.

Geogr. limits.—*N.* The Noric Alps, in Styria.
S. Western Himalayas, lat. 34°.
E. Western Himalayas, long. 75°.
W. Portugal.

b. Calyx truncatus basi umbilicatus.

a. Petala unguibus exauriculatis.

351. S. MELLIFERA, *Boiss. et Reut.*, *Diagn. Pl. Nov.*, p. 8 (1842); *Willk.*, *Ic. Desc. Pl. Nov. Hisp.*, i. (1853) p. 63, t. 46; *Rohrb.*, *Monogr.*, p. 215.

S. nevadensis cum quâ *S. mellifera* sæpe confusa fuerat, ab eâ differt floribus erectis, calycis ore non constricto, petalis

utrinque acute auriculatis, capsulæ cum carpophoro proportione, seminum formâ.

Geogr. limits.—*N.* Sierra de Toledo, in prov. of New Castile.
S. and *E.* Algeria; slopes of Mt. Atlas, above Blidah.
W. Serra Monchique, in Portugal.

352. Silene catholica, *Ait., Hort. Kew*, ed. II. iii. (1812) p. 85; *Reichb., Ic. Fl. Germ. Helv.*, n. 5103; *Rohrb., Monogr.*, p. 215.

Adde Syn. S. Campelli, *Sang., Fl. Rom. Prodr. Alt.*, p. 770, t. 7.

Rohrbach gives the environs of Paris as the northern limit of the species, but here it can only be considered a casual introduction. He also gives Aragon as the western limit, but the Spanish specimens are to be referred to *S. italica*. The claws of the petals, unlike those of the preceding species, are slightly exserted from the calyx.

Geogr. limits.—*N.* Prov. of Ekaterinoslav, in S. Russia.
E. Crimea.
S. Calabria (*Tenore*).
W. Near Rome.

353. S. nivea, *Otth, in DC. Prodr.*, i. p. 377; *Rohrb., Monogr.*, p. 236.

Caulis erectus laxus, simplex, glaber vel vix puberulus. Folia numerosa, elongato-lanceolata, vel lanceolata, acuminata, margine minutissime serrulato-scabrida, superiora cum bracteis herbaceis paullatim minora. Flores pauci, laxe dichotomi, longissime pedicellati. Calyx oblongo-tubulosus glaber, nervis anastomosantibus, dentibus ovatis obtusis, late albo-marginatis, glabris. Petala alba, unguibus longe exsertis, obovato-cuneata, bifida, lobis late ovatis, appendicibus parvis obtusis. Capsula subglobosa, carpophorum æquans. Semina dorso canaliculata.

Geogr. limits.—*S.* Illinois.
E. Pennsylvania.
N. Minnesota } (*MacMillan*, Metasp. Minnes.
W. Iowa } Valley, p. 220 [1892]).

354. S. stellata, *Ait., Hort. Kew*, ed. II. iii. (1812) p. 84; *Sims, Bot. Mag.*, t. 1107 (Cucubalus); *Rohrb., Monogr.* p. 216.

Geogr. limits.—*N.* Canada. *E.* Massachusetts.
S. Georgia. *W.* Texas.

355. SILENE NUTANS, *Linn.*, *Sp. Plant*, ed. I. p. 417; *Syme, Eng. Botany*, ed. III. ii. p. 64, t. 207; *Rohrb.*, *Monogr.*, p. 216.

Ex syn. S. longicilia, est species propria.

Adde syn. S. insubrica, *Gaud.*, *Fl. Helvet.*, iii. p. 173.
S. viridella, *Link*, *Handb.*, ii. p. 242.
S. cuprea, *Reichb.*, *Ic. Fl. Germ. Helv.*, iii. p. 52.

β. FILIFORMIS, *Lange in Kjoeb. Vidensk. Meddel.* 1865 (1866), p. 113; *Willk. et Lange, Prodr. Fl. Hisp.*, iii. p. 665.

Caules tenues, atro-purpurascentes. Folia radicalia, glabra, obscure viridia. Pedicelli elongati, filiformes, erecti, apice inclinati. Calyx 6 mm. (non 10 mm.) longus, striis nigrescentibus. Petala luteolo-alba.

Apparently a form intermediate between *S. nutans* and *S. italica* with subcernuous flowers.

γ. DUBIA, *Herbich*, *Fl. Bucov.*, p. 388 (sp.).

Pili breviores recurvi nec stricti. Flores minores, petalis viridi-luteis. Capsula carpophorum quinquies superans.

Geogr. area.—N. and E. Arctic Siberia.
S. and W. Canary Isles.

356. S. LONGICILIA, *Otth, in DC. Prodr.*, i. p. 377.

Cæspitosa, multicaulis. Caulis erectus aut interdum obliquus, inferne pubescens, et obscure purpurascens, superne glaber et viscosus, geniculatus, inferne usque ad apicem ramosus, ramis patentibus dichotomis. Folia subpuberula, inferioria oblanceolata, vel obovato-spathulata, obtusa vel acuta, non scabra, inferne in petiolum longum attenuata, marginatim lanuginoso-ciliata, superiora lineari-lanceolata, acuta, sessilia; bracteæ parvæ ovatæ acutæ albo-marginatæ ciliatæ. Flores laxi dichotome paniculati, ad apices ramulorum terni. Calyx clavatus glabriusculus, striis viridibus superne anastomosantibus, dentibus ovatis, obtusiusculis, albo-marginatis. Petala supra albida, subtus purpurascentia, unguibus exsertis, bipartita lobis cuneatis, fauce bicallosa. Capsula ovato-conica, carpophorum 4-plo superans. Semina parva, reniformia, dorso canaliculata, faciebus plana, granulata.

A *S. nutante* diversa, magis cæspitosa et dichotome ramosa, foliis radicalibus non scabris, basi longe lanuginoso-ciliatis, floribus plus minus laxis, petalis fauce bicallosis, nec lamellatis.

Syn. Cucubalus longicilius, *Brot.*, *Fl. Lusit.*, ii. (1804) p. 180.

Brotero, in his original description, compares the species with *S. nutans*, and notes the points of difference.

Hab. Central Portugal.

357. SILENE VELUTINOIDES, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 208; *Coss., Illustr. Fl. Atlant.*, fasc. iv. (1890) p. 148, t. 96.

Velutino-subtomentosa. Caules florigeri infrarosulares adscendentes rarius erecti, plurifoliati, simplices, infra racemum ramosum superne glanduloso-viscosi. Folia inferiora obovata vel oblonga, callo mucronata, in petiolum attenuata, utrinque velutino-subtomentosa, caulina minora; bracteæ lanceolato-lineares conduplicato-subinvolutæ, cum pedicellis et calycibus glanduloso-pubescentes. Flores breviter pedicellati, in cymulas 3–5-floras, nonnunquam ad florem terminalem redactas conferti, cymis sæpius in paniculam generalem angustam racemiformem dispositis. Calyx 8–10 mm. longus, tubuloso-infundibuliformis, fructifer superne dilatatus, apice haud constrictus, albido-virescens, striis superne anastomosantibus, dentibus ovato-triangularibus, acutiusculis, late albo-marginatis, ciliatis. Petala intus alba extus viriduli-purpurascentia, bipartita lobis linearibus, bicallosa. Capsula ovata, carpophorum hirtulum bis superans. Semina compressa, faciebus plana striata, dorso obtuse canaliculata ibique tuberculata.

A *S. nutante* diversa, caudice crasso suberoso-sublignoso, foliorum emarcidorum vestigiis superne squamato, pube totius plantæ velutino-subtomentosâ, caulibus infra rosulas foliorum radicalium, non e centro rosularum enatis, petalis fauce bicallosis, stipite capsulæ longitudinem dimidiam subæquante.

Hab. Algeria.

β. Petala unguibus auriculatis.

358. S. OTODONTA, *Franch. in Bull. Soc. Bot. France*, xxxiii. (1886) p. 426.

Caulis erectus, ramosus, puberulus, foliosus. Folia breviter petiolata, e basi attenuata, ovato-lanceolata, mucronulata, subtus ad nervum nunc parce pubescentia, margine ciliolata, ceterùm glabra; bracteæ et bracteolæ breves, lineares, acutæ, cinereo-pubescentes, margine sæpius membranaceæ. Inflorescentiæ rami elongati, paniculato-corymbosi, cymis 4–7-floris; pedicellis calycibusque pubescentibus. Calyx 12–15 mm. longus, campanulatus, dentibus ovatis mucronatis, margine membranaceis, sæpius purpureo-tinctis, ciliolatis. Petala pallide rosea, unguibus exsertis, bifida, lobis linearibus, appendicibus binis, lanceolato-linearibus, acutis. Capsula ovato-conica, carpophoro 3–4-plo longior. Semina reniformia, undique tuberculata, dorso plana.

S. nutantis habitus, diversa autem foliis mucronulatis latioribus et numerosioribus, petalorum formâ.

Hab. China; prov. of Yun-nan.

359. SILENE SPALDINGII, *S. Wats. in Proc. Amer. Acad.*, x. (1875) p. 344; *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 146.

Caulis erectus, foliosus, tomentosus, simplex vel ramosus, superne glanduloso-viscosus. Folia inferiora oblongo-lanceolata, acutiuscula, superiora lanceolata, acuta. Flores in paniculam brevem strictam racemosam dispositi. Calyx subherbaceus, oblongo-cylindricus, fructifer obconicus, nervis anastomosantibus, dentibus ovato-triangularibus, acutiusculis, ciliolatis. Petala viridi-albida, unguibus paullum exsertis, laminâ bidentatâ breviter triangulari, appendicibus 4-partitis, parvis, lanceolatis, obtusis. Capsula ovato-oblonga, breviter stipitata.

Hab. On the Clear Water, Central Idaho; and on the Lumnaha, Union Co., Oregon.

360. S. GALATÆA, *Boiss.*, *Fl. Orient.*, *suppl.*, p. 103 (1888).

Caules adscendentes, flexuosi, tenues, sæpe ramulosi. Folia oblongo-rhombea, breviter petiolata, apice abrupte acuminata, breviter velutino-puberula; bracteæ lineares vel setaceæ, breves. Panicula elongata, laxa pauciflora; floribus longe pedicellatis. Calyx scaber, rubellus, cylindrico-conicus, fructifer clavatus, sub capsulâ constrictus, dentibus alternatim ovatis obtusis, triangularibus acutis. Petala livida, bifida, appendicibus truncatis, erosulis. Capsula oblonga, carpophoro sesquilongior. Semina tuberculata, faciebus subconcava.

A *S. nutante* eximie distincta, foliis abrupte acuminatis, caulis et pedicellorum gracilitate, carpophoro bis longiore.

Hab. Cyprus, near Galata.

Several more species have been described, which are referred to the *S. nutans* group, but which are scarcely to be differentiated from the type itself and are best included in it. The list of synonyms following Rohrbach's description is very formidable, and implies that he considered the species as of a polymorphic type.

Series 9. *Italicæ.*

Flores erecti. Ungues glabri vel ciliatuli, filamenta glabra.

A. Ungues ciliatuli.

361. Silene splendens, *Boiss.*, *Fl. Orient.*, i. p. 631 ; *Rohrb.*, *Monogr.*, p. 218.

Proximæ affinis, sed distincta seminibus dimidio minoribus rugoso-tuberculatis, dorso planis.

Described by Boissier from specimens collected by Balansa and distributed by him in 1857, not in 1847, as stated by Boissier in his original description.

Hab. Near Uscbak, in Anatolia.

362. S. italica, *Pers.*, *Syn. Pl.*, i. p. 498 (1805) ; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5110 ; *Rohrb.*, *Monogr.*, p. 218.

Ex syn. S. insubrica = S. nutans ; S. livida = S. viridiflora ; S. pilosa, est var. propria ; S. sicula, est var. propria.

Var. *β.* floccosa = S. nemoralis, *Waldst. et Kit.*

Adde syn. S. nemoralis (non *Waldst. et Kit.*), *Maly*, *Enum. Pl. Imp. Austr.*, p. 306.
S. catholica (non *Ait.*), *Willk. in Flora*, xxxiv. (1851) p. 600.

β. pilosa, *Spreng.* (sp.), *Syst. Veget.*, ii. p. 411 ; *Waldst. et Kit.*, *Plant. Rar. Hung.*, iii. (1812) p. 277, t. 248 (Cucubalus mollissimus).

Folia undulata pilis densissimis tomentoso-glauca.

Syn. Cucubalus pilosus, *Willd.*, *Enum. Hort. Berol.*, p. 471 (1809).
C. mollissimus, *Waldst. et Kit.*, *Plant. Rar. Hung*, iii. (1812), p. 277, t. 248.
Viscago pilosa, *Hornem.*, *Hort. Hafn.*, i. p. 410.
V. mollissima, *Hornem.*, *l.c.*
S. mollissima, *DC. Prodr.*, i. (1824) p. 382.
S. nemoralis *var.* platypetala, *Griseb.*, *Spicil. Fl. Rumel. Bithyn.*, i. p. 173.
Cucubalus undulatus, *Kit. in Willd. Herb.*, n. 8593, *Rohrb.*, *l.c.*, p. 219.

γ. sicula, *Presl.* (sp.), *Fl. Sicula*, p. 115 (1826) ; *Arcang.*, *Comp. Fl. Ital.*, p. 93 ; *Tanfani, in Parl. Fl. Italiana*, ix. (1892) p. 422.

Planta humilior 1–3-flora, floribus rubris.

Syn. S. cæsia, *Jan, Elench. Pl.*, p. 7.
S. nebrodensis., *Jan, l.c.*
S. italica *var.* humilis, *Tenore, Syll.*, p. 216.
S. italica *var.* montana, *Guss., Fl. Siculæ Prodr.*, i. p. 504.
S. italica *var.* pauciflora, *Guss., l.c.*, p. 489.
S. pauciflora (non *Salzm.*), *Tornab., Fl. Aetnea*, p. 161 (1889–90).

δ. ATHOA, *Halácsy, in Oesterr. Bot. Zeitschr.*, xlii. (1892) p. 368.

Geogr. limits.—*N.* Between Dartford and Darenth, in Kent.
S. Algeria.
E. Asterabad, in prov. of Khorassan, Persia.
W. Portugal.

This species was found at Dover in 1825 by Peete, who described it as a new species under the name of *S. patens*, and cited as a synonym *Cucubalus viscosus*, Huds. (not Linn., which = *Melandryum viscosum*, Celak. [1868]). He was at first inclined to refer the specimens to *S. paradoxa*, a species then known from Dauphiny, but which has since been found in Luxemburg. I have examined fresh specimens from Hythe; according to Syme ('Engl. Botany,' ed. III. vol. ii. p. 66), it has also been found on Salisbury Crags, near Edinburgh; but this record has not been verified.

363. SILENE PSEUDO-NUTANS, *Panč., Addit. Fl. Serb.*, p. 116; *Velen., Fl. Bulgarica*, p. 63.

Caules cæspitosi, erecti, a medio in ramos tenues divisi, inferne dense pubescentes, superne viscidi. Folia inferiora spathulata, in petiolum attenuata, caulina dimorpha, linearia, basi tenuiora, rigida, falcato-recurva; bracteæ minimæ, lineares, summæ ovato-inflatæ. Flores solitarii vel ad 2–3 fasciculati, pedicellis calyci subæquilongis. Calyx tenuis, fructifer infra capsulam constrictus, sparse glandulosus, dentibus triangulari-ovatis, albo-marginatis, ciliatis. Petala luteo-alba, bifida, unguibus auriculatis dente obtuso. Capsula ovoideo-oblonga, carpophoro 3-plo longior. Semina granulata.

Præcedenti affinis, sed in *S. italica*—caules simplices vel ramosi inferne tomentello-canescentes, flores in racemo plus minus composito rarò in racemo simplici paucifloro, capsula carpophorum subæquans vel usque duplo longior.

Hab. Servia, N. Bulgaria, and Eastern Roumelia.

364. S. NEMORALIS, *Waldst. et Kit., Plant. Rar. Hung.*, iii. (1812) p. 277, t. 249; *Ficin. in Zeitschr. Natur. Heilk.*, i. t. i. (Cucubalus floccosus); *Rohrb., Monogr.*, p. 220 (S. italica *var.* floccosa).

Caules cæspitosi, erecti, sæpius simplices, inferne cano-hirsuti, superne viscidi. Folia scabriuscula pilis brevissimis canescentia, inferiora ovato-rotundata, spathulata, undulata, apiculata, in petiolum barbato-ciliatum angustata, superiora sessilia demùm lanceolata; bracteæ lineari-subulatæ, dense ciliatæ. Flores in paniculâ erectâ, multiflorâ, ramis inferioribus 5-floris, superioribus dichotome trifloris, flore intermedio breviter pedicellato. Calyx clavatus, truncatus, pubescens, striis anastomosantibus purpurascentibus, dentibus brevibus, obtusis, ciliatis. Petala alba, unguibus exsertis, bipartita, lobis lineari-oblongis, appendicibus bifidis. Capsula ovata, carpophoro paullum brevior. Semina dorso leviter canaliculata, faciebus plana ruguloso-tuberculata.

β. PEDEMONTANA, *Burnat et Barbey*, *Not. Voy. Bot. Bal. Hisp.*, p. 53 (1882).

Planta major, 75 centim. alt., caulibus semper ramosis, superne subglabris. Folia caulina superiora acuminata. Calyx inter strias glaber, striis rubellis vel purpurascentibus scabro-puberulis.

Hab. Val Pesio, near Gias Serpentera.

γ. CRASSICAULIS, *Willk. et Costa* (sp.) *in Linnæa*, xxx. (1859) p. 91; *Burn. et Barb.*, *Not. Voy. Bot. Bal. Hisp.*, p. 53 (1882); *Bull. Herb. Boiss.*, i. (1893) App. ii.

Stirps gigantea, stolonifera, molliter puberula. Calyx oblongo-clavatus. Petala lutescentia ecoronata biloba.

Geogr. limits.—Central Europe.

N. Saxony; near Dresden.
S. Servia.
E. Transylvania.
W. Catalonia (*var.* γ).

365. SILENE SPINESCENS, *Sibth. et Sm.*, *Fl. Græc. Prodr.*, i. p. 299; *Fl. Græca*, v. p. 22, t. 431; *Rohrb.*, *Monogr.*, p. 220.

Ex *S. italicæ* affinitate, differt autem caulibus suffrutescentibus ramos steriles rigidos edentibus, foliis, calyce breviore, striis superne tantum venosis, totoque habitu.

Geogr. area.—Greece.

366. S. TANAKÆ, *Maxim. in Bull. Imp. Acad. Pétersb.*, xxxii. (1888) p. 481.

Suffruticosa a basi ramosissima, ramis omnibus longiusculis, plerisque foliosis sterilibus, paucis elongatis floriferis, internodiis glabris. Folia minute puberula, cauliculorum sterilium crebra, elliptico-spathulata, fertilium remota, lanceolato-spathulata; omnia in petiolum brevem basi ciliatum attenuata. Inflorescentiæ rami primarii triflori; bracteæ lanceolatæ; pedicelli calyci æquilongi. Calyx cylindricus umbilicatus puberulus, dentibus ovatis villoso-ciliatis. Petala purpurea, cuneata, emarginata, unguibus exauriculatis vix exsertis, appendicibus brevibus. Ovarium carpophorum æquans.

Planta suffruticosa habitu melius cum *S. struthioloidi* quam cum *S. lanceolatâ* (speciebus Sandvicensibus) conveniens, ad quam posteriorem tamen e characteribus (calyce hujus brevi excepto) accedere videtur. Priori, a Rohrbach ad "Sclerocalycinæ" relatæ, quamvis in descriptione originali calycis duri nulla mentio facta sit, hæcce ob floris formam totumque habitum propior, sed foliorum magnitudo potius *S. lanceolatæ*. Reliquæ species hujus divisionis, fere omnes mediterraneæ, rosulas sæpius sessiles habent et habitu minus similes sunt.

Originally described from specimens raised from seed sent by D. Tanaka, which flowered in the St. Petersburg Botanic Gardens in October, 1887.

Hab. S. Japan.

367. Silene Sieberi, *Fenzl, Pugill. Plant. Nov. Syr.*, p. 8, n. 22, *et in Russegg. Reise*, ii. p. 912, lusus 2; *Rohrb.*, *Monogr.*, p. 221.

Hæc species et sequens toto habitu et calycis formâ ad seriem *Italicæ*, artificialiter autem inflorescentiâ sæpius dichotomâ vel alternatim ramulosâ ad seriem *Auriculatæ* accedunt.

Hab. Island of Crete.

B. Ungues glabri.

a. Capsula carpophoro sesqui-vel duplo brevior.

368. S. Schwarzenbergeri, *Halácsy, in Denkschr. Math. Naturwiss. Cl. Akad. Wien* (1894), p. 472, cum icone; et in litt. ab auctore (1895).

Inferne griseo-pubescens, superne viscidula, basi suffrutescens. Caules numerosi, erecti, simplices, bi- vel abortu uniflori. Folia basilaria, parva, obovato-spathulata, mucronata, caulina minima, anguste linearia. Calyx umbilicatus, etiam sub anthesi elongato-clavatus, viridi-vittatus, pubescens, dentibus ovatis, obtusiusculis, albo-marginatis, ciliatis. Petala livida, in lobos oblongo-spathulatos bipartita, appendicibus binis, lanceolatis, acutis. Antheræ purpureæ. Capsula oblonga, carpophoro subbrevior.

Valde affinis *S. Sieberi*, a quâ tamen differt foliis basilaribus mucronatis sessilibus, floribus minoribus, unguibus glabris, et appendicibus binis, acutis.

Hab. Mt. Pindus, in Thessaly; on the cliffs of Oxya, 1,500 metres, above Khaliki, just beyond the Turkish frontier in the nome of Trikhala.

369. SILENE FENZLII, *Boiss. et Bal., Diagn. Pl. Nov. Or.*, Ser. II. vi. p. 30 (1859); *Rohrb., Monogr.*, p. 221.

Valde affinis *S. Sieberi*, a quâ tamen differt floribus longe pedicellatis, calycis multò longioris striis superne venosis, petalis roseis, unguibus obsolete auriculatis glabris, lobis obovatis, capsulæ cum carpophoro proportione.

Hab. Mt. Taurus, in Cilicia.

The description of the next species in Rohrbach's 'Monograph' is incomplete and somewhat inaccurate, as good specimens were not available for examination. It should be placed with *S. Fenzlii*, and not with *S. ovata*. Having had the opportunity of examining a good series of specimens, I have thought it best to draw up a fresh description based upon the material to hand.

370. S. FORTUNEI, *Vis., Ind. Hort. Patav.* (1847), *ex Linnæa*, xxiv. (1851) p. 181; *Maxim., Fl. Asiæ Or. Fragm.*, p. 6; *Franch., Pl. David.*, p. 47; *Forbes et Hemsl. in Journ. Linn. Soc. (Bot.)*, xxiii. (1886) p. 65.

Scaberulo-pubescens, basi suffruticosa. Caules numerosi, erecti, apicem versus viscosi, inferne sæpe ramos breves alternos foliosos adscendentes edentes. Folia lineari-lanceolata, acuta, in petiolum ciliatum attenuata, superiora sæpe fasciculata, cum bracteis ac prophyllis minoribus linearia. Flores, racemi ramis brevibus cymosis vel unifloris approximatis, breviter pedicellati. Calyx 30–35 mm. longus, elongato-tubulosus, basi truncatâ umbilicatus, glaber, striis superne anastomosantibus, dentibus ovatis, acutiusculis, late albo-marginatis, ciliolatis. Petala rosea vel alba, unguibus dente elongato-lineari biauriculatis, laminâ bipartitâ, lobis irregulariter plus minus profunde incisis, appendicibus binis, linearibus, crenulatis. Capsula oblonga, carpophoro glabro suffulta. Semina tuberculata, dorso lato obtuse canaliculata, faciebus planiuscula.

Syn. ? S. sinensis, *Hook. in Bosse, Handb. Blumengart.*, ed. II. iii. p. 388 (1842).
S. fissipetala, *Turcz. in Bull. Soc. Nat. Mosc.*, xxvii. (1854) pars II. p. 371.

Geogr. area.—China.
N. Prov. of Che-kiang.
S. Island of Formosa.
E. Island of Chusan, off the coast of prov. of Che-kiang.
W. Kiu-kiang, in the prov. of Kiang-si.

b. Capsula carpophorum bis terve superans.

α. Petala multifida.

371. SILENE OVATA, *Pursh, Fl. Amer. Sept.*, i. p. 316 (1814); *B. L. Robinson, in Proc. Amer. Acad.*, xxviii. (1893) p. 133; *Rohrb., Monogr.*, p. 222.

Adde: Planta glabra vel pubescens; petala alba nec pallide rosea.

Geogr. limits.—*N.* Kentucky. *E.* N. Carolina.
S. Georgia. *W.* Alabama.

β. Petala bifida.

372. S. NEVADENSIS, *Boiss., Voy. Bot. Esp.*, ii. p. 721 (*suppl.*); *Willk., Ic. Desc. Pl. Nov. Hisp.*, i. p. 62, t. 45 A; *Rohrb., Monogr.*, p. 222.

Differt a *S. italicâ* (cui ut varietatem primum eam Boissier retulit), floribus minoribus, calyce fructifero aperto, glabro, neque apice constricto, puberulo, petalis acute biauriculatis, capsulæ seminumque formâ.

Geogr. area.—Spain.
S. and *W.* Andalusia; Sierra Nevada.
N. Santander, in Old Castile (*Salc., ex Nym., Consp. Fl. Eur., suppl.*, ii. p. 52).
E. Near Horta, in Catalonia (*Costa, Ampl. Cat. Catal.* [1873]).

373. S. RHODOPEA, *Janka, Descr. Pl. Nov. in Termész. Füz.*, ii. (1878) 28; *Boiss., Fl. Orient., suppl.*, p. 108.

Pubescens, viscosa. Caulis erectus, elatus, foliosus, axillis fasciculigeris, superne valde ramosus, effuse paniculatus. Folia cuneato-spathulata, acuta, in petiolum attenuata, suprema linearia; bracteæ ovato-naviculares, obtusæ, semi-scariosæ.

Calyx obconico-tubulosus, fructifer sub capsulâ constrictus, glaber umbilicatus, dentibus ovatis, ciliolatis. Petala albida, ecoronata. Capsula ovata.

Hab. E. Rumelia; Staminak, near Philippopolis.

374. SILENE SKORPILI, *Velen.*, *Pl. Exs.* (1889), *et ej. Fl. Bulgarica*, p. 64.

Pubescens, viscosa. Caulis erectus, elatus, foliosus, superne valde ramosus. Folia oblongo-lanceolata, mucronata, sessilia, suprema linearia. Inflorescentiæ rami rigidi; flores ad ramos 3–5-ni fasciculati, rarius ramis racemiformibus, breviter pedicellati. Calyx oblongo-clavatus membranaceo-coriaceus, glaberrimus, viscidus, brevissime dentatus, fructifer clavatus, dentibus triangularibus, ciliolatis. Petala virentia, unguibus anguste biauriculatis, laminâ bifidâ ecoronatâ, lobis linearibus. Capsula oblongo-ellipsoidea. Semina minute tuberculata.

Hab. Bulgaria.

375. S. BEHRII, *mihi.* *Rohrb.* (var.) *in Linnæa*, xxxvi. (1869) p. 264.

Basi suffrutescens, inferne puberula, superne glanduloso-viscida. Caules erecti, simplices, inferne foliosi. Folia acuta, inferiora oblongo-lanceolata, superiora lanceolata, vel lanceolato-linearia. Flores laxe paniculati, longe pedicellati. Calyx oblongo-cylindricus, fructifer infra capsulam constrictus, dentibus reticulato-venosis, triangularibus, acutiusculis, albo-marginatis ciliolatis. Petala rosea, unguibus latis auriculatis, laminâ oblongâ, lobis linearibus extus dente uno acuto auctis, appendicibus binis, oblongis, obtusis, denticulatis. Filamenta inclusa. Capsula ovoidea.

Syn. S. nicæensis, *Cham. et Schlecht. in Linnæa*, i. (1826) p. 41 (non *All.*).
S. verecunda, *S. Wats. in Proc. Amer. Acad.*, x. (1875) p. 344.

Hab. On rocky hills above Mission Dolores, near San Francisco, California (*Behr*).

376. S. LUISANA, *S. Wats. in Proc. Amer. Acad.*, xxiii. (1888) p. 261; *B. L. Robinson, l.c.*, xxviii. (1893) p. 141.

Puberula, superne viscida. Caules erecti, simplices, inferne foliosi. Folia acuta, inferiora lanceolato-linearia, superiora elongato-linearia. Panicula diffusa, floribus breviter pedicellatis. Calyx oblongo-clavatus, fructifer clavatus infra capsulam constrictus, dentibus oblongo-ovatis, acutis, albomarginatis, ciliolatis. Petala alba, unguibus auriculatis, laminâ oblongâ, lobis linearibus, extra dente uno acuto auctis, appendicibus binis, lanceolatis, acutis, denticulatis. Capsula subcylindrica. Semina compressa, dorso granulata.

Hab. California; San Luis Obispo, Tolon, and mountains south of Fort Tejon.

377. SILENE PECTINATA, *S. Wats. in Proc. Amer. Acad.*, x. (1875) p. 344; *B. L. Robinson, l.c.*, xxviii. (1893) p. 139.

Basi suffrutescens, glanduloso-pubescens. Caules erecti, simplices vel ramosi. Folia lanceolata, inferiora acuta, in petiolum laminam æquantem attenuata, superiora acuminata. Panicula stricta vel dichotome ramosa, floribus longe pedicellatis. Calyx oblongo-tubulosus, fructifer ovatus, dentibus lanceolato-linearibus acutis. Petala rubella vel purpurascentia, profunde bipartita, laminâ oblongâ, lobis linearibus, appendicibus binis, lanceolatis. Capsula ovata.

Lusus 2. Vix viscidula. Caules subsimplices foliis inferioribus fere glabris.

Syn. S. pectinata *var.* subnuda, *B. L. Robinson, l.c.*, p. 140.

Hab. United States; California and Nevada.

378. S. LYALLII, *S. Wats. in Proc. Amer. Acad.*, x. (1875) p. 342; *B. L. Robinson, l.c.*, xxviii. (1893) p. 144.

Minute puberula, multicaulis, cæspitosa. Caules foliosi, adscendentes. Folia inferiora lineari-lanceolata, acuta, basi attenuata, subpetiolata. Inflorescentia diffusa; cymæ glanduloso-pubescentes, dichotomæ pauciforæ; pedicelli tenuiter graciles. Calyx ampliato-campanulatus, dentibus triangularibus, obtusis, reticulato-venosis. Petala fusco-purpurea, bifida, lobis late ovatis, appendicibus oblongis, integris. Antheræ purpureæ, inclusæ. Capsula anguste oblonga.

In some of these species the anthers are often infested with a fungus (*Ustilago antherarum*), and in consequence enlarge and turn purple.

Hab. Cascade Mountains, Washington Territory, and Sierra Co., California.

379. S. PHRYGIA, *Boiss., Fl. Orient.*, i. p. 644; *Rohrb., Monogr.*, p. 223.

At first sight this would appear to be an annual, as the plant has a very slender root.

Hab. Anatolia.

380. SILENE EREMITICA, *Boiss., Fl. Orient.*, i. p. 644; *Rohrb., Monogr.*, p. 223.

Species floribus minoribus et carpophoro brevi ad seriem *Brachypodæ* accedens, sed ob calycem glabrum hic collocata.

β. ASTARTES, *Boiss. et Blanche* (sp.) *in Boiss., Fl. Orient., suppl.*, p. 102.

Folia tomentella, pallide virentia, surculorum ovato-oblonga in petiolum longum attenuata, caulina anguste linearia. Calyx nervis viridibus.

Hab. Prov. of Aderbidjan, in N. Persia; *var. β.* in the Lebanon (*Blanche*), and in the Anti-Lebanon (*Post, in Bull. Herb. Boiss.*, i. [1893] p. 396).

γ. Petala integra.

381. S. LANCEOLATA, *A. Gray, Bot. U.S. Expl. Exped.*, i. p. 111, t. 10 (1854); *Rohrb., Monogr.*, p. 223.

Adde: Calyx evenius, in petiolum attenuatus.

β. ANGUSTIFOLIA, *Hillebrand, Fl. Haw. Isl.*, p. 28.

Folia linearia tantum 2 mm. lata.

Hab. Hawaiian Islands.

382. S. ALEXANDRI, *Hillebrand, Fl. Haw. Isl.*, p. 28 (1883).

Caulis erectus, glaber, paullum ramosus. Folia coriacea, glabra, lanceolata, acuta, ad basin angustatam ciliata; bracteæ et prophylla lineariæ ciliatæ, infra pedicellorum medium. Flores subpaniculati, longius pedicellati. Calyx tenuiter clavatus, leviter umbilicatus, glaber, dentibus ovatis, acutis. Petala alba, cuneata, interdum leviter emarginata, unguibus exsertis, appendicibus minutis vel nullis. Capsula ovoidea. Semina tuberculata.

Hab. Hawaiian Islands.

c. Capsula carpophorum æquans, vel eo 1½-longior.

α. Calyx striis anastomosantibus.

383. S. PAUCIFLORA, *Salzm. ex DC. Prodr.*, i. p. 382 (1824); *Moris, Fl. Sardoa*, i. p. 251, t. 16; *Rohrb., Monogr.*, p. 224.

Adde : Planta subsericeo-pubescens ; striæ calycinæ superne anastomosantes.

Præter alias notas, a *S. italicâ* et affinibus jam primo aspectu caulibus differt infrarosularibus.

Hab. Corsica and Sardinia.

384. SILENE SALZMANNI, *Badaro, ex Moretti in Brugnat. Giorn.* ix. (1826) p. 78 ; *Rohrb., Monogr.*, p. 224.

Species *S. italicæ* valde affinis, sed characteribus minoribus sat diversa.

Adde syn. S. italica *var.* Salzmanni, *Arcang. Comp. Fl. Ital.*, p. 93.

Geogr. limits.—*N.* and *W.* Coast of Liguria, near Noli.
S. Corsica.
E. Island of Capraja, in the gulf of Genoa.

385. S. FRUTICOSA, *Linn., Sp. Plant.*, ed. I. p. 417 ; *Sibth. et Sm., Fl. Græca*, v. p. 20, t. 428 ; *Rohrb., Monogr.*, p. 225.

Adde : Bracteæ et prophylla lineariæ acuminatæ.

Adde syn. S. agrigentina, *Loj. in Nat. Sicil.*, ii. (1883) p. 295.

β. ROSEA, *Tornab., Fl. Aetnea*, i. p. 165 (1889).

Panicula elata, umbellata. Bracteæ lineari-ovatæ acutæ. Lamina pallide rosea.

Geogr. limits.—*N.* Island of Saria, in the Turkish Archipelago (to the north of Karpathos), also Island of Kasos. (*Major and Barbey*, nn. 474, 753, *ex Bull. Herb. Boiss.*, ii. [1894] pp. 242, 333).
S. and *E.* Cyprus.
W. Sicily; near Palermo.

386. S. ROSULATA, *Soy.-Will. et Godr., Monogr. Sil. Algér.*, p. 50 ; *Exped. Sc. Algér. Bot.*, t. 82 ; *Rohrb., Monogr.*, p. 226.

β. AMURENSIS, *mihi.* *Pomel*, (sp.) *Nouv. Mat. Fl. Atlant.*, p. 209.

E basi lignosâ suffruticosa. Bracteæ glabrescentes. Capsula ovoideo-oblonga, pubescens.

Hab. Algeria.

387. S. MOLLISSIMA, *Pers., Syn. Plant.*, i. p. 498 (1805) ; *Willk., Ic. Desc. Pl. Nov. Hisp.*, i. p. 59, t. 43 ; *Rohrb., Monogr.*, p. 226.

Geogr. limits.—*N.* Corsica.
E. Sardinia (*Lisa* [1837], *in Herb. Moris.*).
S. Algeria.
W. Andalusia.

β. Calyx evenius.

388. SILENE GIBRALTARICA, *Boiss.*, *Elench. Pl.*, p. 20; *Voy. Bot. Esp.*, p. 91, t. 26 A; *Rohrb.*, *Monogr.*, p. 227.

A *S. mollissimâ* differt, caulibus superne glabris viscidis, calycis striis rubellis, velutinis, haud anastomosantibus, petalorum laminâ pallide violaceâ, semilunari-excisâ, seminum faciebus leviter concavis.

Adde syn. S. auriculæfolia, *Pomel, Nouv. Mat. Fl. Atlant.*, p. 332.

Hab. Gibraltar, in fissures of rocks on the east side; and Serra de Cintra, near Lisbon (*Winkler* [1876], *ex Willk. et Lange*, *Prodr. Fl. Hisp.*, iii. p. 667).

389. S. HIFACENSIS, *Rouy*, *in Willk. Illustr. Fl. Hisp.*, i. (1885) p. 150, t. 89; *Prodr. Fl. Hisp.*, *suppl.*, p. 282 (1893).

Suffrutescens; rhizomate vel caudice reliquiis petiolorum foliorum emortuorum squamato, foliorum rosulas caulesque floriferos edente. Caulis erectus, robustus, sulcatus, angulatus, aut non nisi cymam terminalem 4–5-floram umbelliformem, aut cymam terminalem compositam multifloram compactam, et sub eâ cymas axillares simplices ferens. Folia læte virentia, spathulato-lanceolata vel obovato-lanceolata, cum caule bracteisque dense sed brevissime velutina, inferiora in petiolum latum basi vaginantem attenuata, bracteæ et prophylla ovato-lanceolatæ. Flores speciosi breviter pedicellati. Calyx cylindrico-clavatus, fructifer clavatus, umbilicatus tenuissime puberulus, dentibus seu lobis suborbicularibus, late albo-marginatis, dense ciliatis, sinubus interlobaribus rotundato-excavatis. Petala supra ochroleuca, subtus purpurascentia, unguibus exsertis, laminâ late obovatâ, bilobâ, lobis latis subtruncatis, ecoronata. Capsula ovata rostrata.

a. PSEUDOGIBRALTARICA, *Rouy*, *in Willk. Illustr. Fl. Hisp.*, i. (1885) p. 150; *Prodr. Fl. Hisp.*, *suppl.*, p. 282.

Folia rosularum dense congesta spathulata obtusa, 3–4 centim. longa. Caulis brevis 8–10 centim. longus, duo solùm foliorum paria ferens. Cyma simplex umbelliformis 4–5-flora.

β. PARVIFOLIA, *Rouy*, *ll. cc.*

Folia rosularum minora, valde congesta acutiuscula. Caules altiores. Cyma pauciflora ut in var. (typica) *a.*

γ. PSEUDOVELUTINA, *Rouy*, *ll. cc.*, 151, 282.

Folia rosularum magna, obovato-oblonga, acuta, 8–12 centim. longa. Caules 25–35 centim. longi, 4–6 foliorum paria, et cyman compositam multifloram terminalem, sæpe etiam cymas simplices axillares ferentes. Calyx sub anthesi 16–18 mm. longus.

A species chiefly distinguished from *S. gibraltarica* by the peculiar structure of the lobes of the calyx.

Hab. E. Spain, district of Alicante; on Mt. Hifac (*Rouy*, 1883), and on the promontory of San Antonio, near Denia (*Lacaita*, 1884).

390. SILENE PARADOXA, *Linn.*, *Sp. Plant.*, ed. II. p. 1673; *Reichb.*, *Ic. Fl. Germ. Helv.*, n. 5113; *Rohrb.*, *Monogr.*, p. 225.

β. MARITIMA, *Reverch.*, *Pl. Sard. Exs.* (1881), n. 180 (*ined.*).

Folia basilaria latiora in petiolum brevem attenuata. Flores in racemo multifloro, in pedicellis calyce multo brevioribus suffulti.

Hab. Sta. Liberata, coast of Sardinia.

In all the specimens I have examined, the nerves of the calyx are simple, and do not anastomose: this is still more evident in the smoother calyx of var. β. I have therefore transferred the species hither from the place assigned to it by Rohrbach.

Geogr. limits.—*N.* Near Luxemburg.
S. Greece; Pylos (Navarino), in the nome of Messenia.
E. Rumelia; Mt. Chortiasch, near Salonica.
W. France; mountains of Dauphiny.

SPECIES EXCLUSÆ.*

(Ad genus *Melandryum* imprimis referendæ.)

Silene adenantha, Franch., Pl. Delavay., p. 84 (1889–90).
S. asclepiadea, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 422.
S. aspera, A. Br. ex Rohrb., Monogr., p. 174.
S. Bernardina, S. Wats. in Proc. Amer. Acad., xxiv. (1889) p. 82.
S. cæspitosa, Bin. et Franch. in Journ. Botanique (1891), p. 22.
S. cardiopetala, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 418.
S. Cœli-rosa, A. Br. ex Rohrb., Monogr., p. 174.
S. comollina, Ser., Fl. Jard., iii. (1849) p. 337 (hortensis).
S. Delavayi, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 424.
S. Drummondi, Hook. ex Rohrb., Monogr., p. 183.
S. Hoefftiana, Fisch. ex Rohrb., l.c., p. 148.
S. lacera, Sims, ex Rohrb., l.c., p. 88.
S. læta, A. Br. ex Rohrb., l.c., p. 166.
S. lankongensis, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 421.
S. Lemmonii, S. Wats. in Proc. Amer. Acad., x. (1875) p. 342.
S. Loiseleurii, Godr. ex Rohrb., Monogr., p. 166.
S. longistylis, Engelm. in Proc. Amer. Acad., xxii. (1886) p. 469.
S. melanantha, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 429.
S. montana, S. Wats. in Proc. Amer. Acad., x. (1875) p. 343.
S. multifida, Edgew. ex Rohrb., Mongr., p. 205.
S. napuligera, Franch., Pl. Delavay., p. 82 (1889–90).
S. nivalis, Rohrb., Monogr., p. 142.
S. occidentalis, S. Wats., Proc. Amer. Acad., x. (1875) p 343.
S. oregana, S. Wats., l.c.
S. Palmeri, S. Wats, l.c., xi. (1876) p. 124.
S. Parishii, S. Wats., l.c., xvii. (1881–82) p. 366.

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* Supplementary only to those given by Rohrbach ('Monogr.,' p. 231).

Silene phœnicodonta, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 422.

S. platyota, S. Wats. in Proc. Amer. Acad., xvii. (1881–82) p. 366.

S. platypetala, Bin. et Franch. in Journ. Botanique (1891), p. 22.

S. platyphylla, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 419.

S. plicata, S. Wats. in Proc. Amer. Acad., xvii. (1881-82) p. 366.

S. Potanini, Maxim. in Act. Hort. Petrop., xi. (1890) p. 66.

S. pterosperma, Maxim., l.c., p. 67.

S. quadriloba, Turcz. ex Rohrb., Monogr., p. 205.

S. Royeni, Pers. ex Rohrb., l.c., p. 205.

S. rubicunda, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 417.

S. sachalinensis, F. Schmidt, Reisen Amurl., p. 116.

S. sarawschanica, Regel et Schmalh. Pl., Nov. Fedtsch., p. 14.

S. schizolepis, Turcz. in Bull. Soc. Nat. Mosc., xxvii. (1854) II. p. 370.

S. scopulorum, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 423.

S. Shockleyi, S. Wats. in Proc. Amer. Acad., xxv. (1890) p. 127.

S. Sigeri, Baumg. ex Rohrb., Monogr., p. 143.

S. simulans, Greene, in Pittonia, i. p. 63.

S. Stracheyi, Edgew. in Hook. f., Fl. Brit. Ind., i. p. 221 (*Viscaria*).

S. suaveolens, Kar. et Kir. ex Rohrb., Monogr., p. 206.

S. subciliata, Robinson in Proc. Amer. Acad., xxix. (1894) p. 327.

S. Thurberi, S. Wats., l.c., x. (1875) p. 343.

S. Tilingi, Regel in Act. Hort. Petrop., i. (1871) p. 99.

S. trachyphylla, Franch. in Bull. Soc. Bot. France, xxxiii. (1886) p. 417.

S. viscosa, Pers. ex Rohrb., Monogr., p. 205.

S. Yanœi, Makino, in Ill. Fl. Japan, i. (1891) p. 52.

SPECIES CANDOLLEANÆ.

(*Otth, in DC. Prodr.*, vol. i. pp. 367–385.)

In the first volume of the 'Prodromus,' Adolph Otth enumerates 217 species. It will be interesting to go through this list for the purpose of comparing the number of good species with the number enumerated in the present revision. Of the 217 there given, 103 are maintained and admitted under the same name in the foregoing enumeration as good species. Rather more than half, *viz.* 114, are to be accounted for by a process of elimination, which is carried out in the following paragraphs.

Three species cannot be satisfactorily identified:—*S. amœna*, Linn., *S. distans*, Otth, and *S. latifolia*, Poir. The last has been referred to *S. italica*, Pers., but the meagre description does not warrant it: 28 are to be referred to other genera, *viz.*, *Melandryum* (22), *Heliosperma* (3), and one each to *Gypsophila*, *Petrocoptis*, and *Eudianthe*. They are disposed of as follows:—

S. Allamanni, laciniata, mexicana, Mociniana = Melandryum laciniatum, *Rohrb.*

S. auriculata = Melandryum auriculatum, *Rohrb.*

S. Baldwynii = Melandryum Baldwini, *Rohrb.*

S. capensis, ornata, undulata = Melandryum ornatum, *Aschers.*

S. Catesbœi, virginica = Melandryum virginicum, *A. Br.*

S. pennsylvanica, platypetala = Melandryum pennsylvanicum, *Rohrb.*

S. indica = Melandryum indicum, *Walp.*

S. lanuginosa = Melandryum lanuginosum, *Rohrb.*

S. lacera = Melandryum lacerum, *mihi* (near M. Elizabethæ).

S. noctiflora = Melandryum noctiflorum, *Fries.*

S. regia = Melandryum illinoënse, *Rohrb.*

S. Requieni = Melandryum Requieni, *Rohrb.*

S. rotundifolia = Melandryum rotundifolium, *Rohrb.*

S. Siegeri = Melandryum nivale, *Nym.*

S. viscosa = Melandryum viscosum, *Celak.*

Silene alpestris, quadridentata, viscida = Heliosperma alpestre, *Reichb.*
S. polygonoïdes = Gypsophila hirsuta, *Spreng.*
S. glaucifolia = Petrocoptis pyrenaïca, *A. Br.*
S. rugosa = Eudianthe Cœli-rosa, *Reichb.*

Three names have been changed:—

S. Atocion, Murr. = S. ægyptiaca, *Linn. f.*
S. caryophylloides, Otth = S. stentoria, *Fenzl.*
S. tridentata, Desf. = S. calycina, *Salzm.*

The species, to the number of 80, which form the remainder, are either reduced to varieties or become ordinary synonyms of other species of the genus. They are as follows (as far as may be, in the order given by Otth):—

S. Coulteriana = S. inflata.
S. graminifolia, viscaginoides, jeniseensis, tenuifolia = S. tenuis.
S. oblongifolia, diversifolia, crispa = S. rubella.
S. gypsophila = S. repens.
S. hispanica = S. littorea.
S. carnosa, inclusa, nyctantha, pinguis = S. nocturna.
S. angustifolia, linearifolia = S. petræa.
S. wolgensis, parviflora, effusa = S. Otites.
S. verticillata = S. spergulifolia.
S. elata = S. chlorantha.
S. ruthenica = S. tatarica.
S. involuta = S. pruinosa ? ?
S. cylindriflora = S. conoidea.
S. anglica, lusitanica, quinquevulnera, sciotica = S. gallica.
S. coarctata = S. calycina.
S. ocymoides, patula = S. italica.
S. hirsutissima, laxiflora, sabuletorum = S. hirsuta.
S. micrantha, cheiranthifolia = S. micropetala.
S. canariensis = S. mogadorensis.
S. setacea = S. discolor.
S. hispida, bellidifolia = S. vespertina.
S. canescens, Oliveriana, diffusa, pubescens = S. sericea.
S. decumbens = S. procumbens.
S. dianthifolia = S. altaïca.

Silene iberica, *sessiliflora* = S. dichotoma.
S. velutina, *Salzmanni*, *tomentosa* = S. mollissima.
S. colorata, *geminiflora* = S. obtusifolia.
S. gracilis = S. longicaulis.
S. secundiflora = S. glauca.
S. viscosissima, *leucophæa* = S. nicæensis.
S. grata = S. reticulata.
S. lychnidiflora = S. cretica.
S. linifolia, *cernua*, *costata*, *arenarioides* = S. clandestina.
S. filiformis, *picta* = S. juncea.
S. parvifolia = S. disticha.
S. petræa = S. Saxifraga.
S. quadrifida, *rubens* = S. nutans.
S. spathulata = S. pygmæa.
S. glauca = S. crassipes.
S. corsica = S. succulenta.
S. bicolor, *polyphylla* = S. portensis.
S. Kaulfussii = S. rupestris ?
S. ramosa = S. sedoides.
S. cana, *paniculata* = S. nemoralis.
S. linoides = S. linifolia.
S. perfoliata = S. chloræfolia.

This disposes of the 114 names not kept up as species; those maintained will be found in the Index.

INDEX.

The following index consists of two sets of names arranged in a single alphabetical series:—(1) The names of the 390 admitted species enumerated in the foregoing Revision, each name being followed by the date of publication and its number in the list; and (2) Synonyms supplementary to those given by Rohrbach, or incorrectly given by him, each name being followed by the name of the species to which it is reduced.

acaulis, *Linn.* (1762), 171.
acutifolia, *Rohrb.* (1868), 166.
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adusta, Ball (mogadorensis).
ægyptiaca, *Linn. f.* (1781), 205.
æthiopica, Burm. f. (?? Burchellii).
ætolica, Heldr. (Ungeri).
affghanica, *Rohrb.* (1867), 338.
affinis, *Boiss.* (1854), 61.
agrestina, Jord. & Fourr. (gallica).
agrigentina, Loj. (fruticosa).
Akinfijewi, *Schmalh.* (1892), 8.
Alexandri, *Hilleb.* (1883), 382.
Almolæ, *J. Gay* (1850), 238.
alpestris, Willd. (rupestris).
alpina, S. F. Gray (acaulis).
altaïca, *Pers.* (1805), 300.
amana, *Boiss.* (1867), 349.
ammophila, *Boiss. & Heldr.* (1849), 31.
amœna, Hill (maritima).
amœna, Huds. (inflata).
amphorina, *Pomel* (1874), 40.
ampullata, *Boiss.* (1842), 19.
amurensis, Pomel (rosulata).
andryalæfolia, *Pomel* (1874), 318.
anglica, Linn. (gallica).
angustifolia, D. Dietr. (clandestina).
anisoloba, Schrenk (Montbretiana).
Antelopum, Steud. (inflata).
antiochicha, Freyn (squamigera).
antirrhina, *Linn.* (1753), 235.
antirrhina, Otth (rubella).
apetala, Groves, Fl. Terr. (nocturna *var.* α).
apetala, Groves, Contrib. (nocturna *var.* β).
apetala, *Willd.* (1799), 89.
aprica, *Turcz.* (1836), 345.
arabica, *Williams* (1896), 70.
araxina, *Trautv.* (1875), 7.
arenosa, *Koch* (1841), 223.
argæa, *Fisch. & Mey.* (1854), 105.
argentea, Ledeb. (cappadocica).
argillosa, *Munby* (1864), 204.
arguta, *Fenzl* (1842), 148.
Aristidis, *Pomel* (1874), 308.
armena, *Boiss.* (1842), 268.
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Armeria, Asso (rubella).
Armeria, *Linn.* (1753), 188.
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arvensis, Losc. (muscipula).
asperifolia, Freyn (longipetala).
assyriaca, Haussk. & Bornm. (crassipes).
Astartes, Boiss. & Blanche (eremitica).
Asterias, *Griseb.* (1843), 191.
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atocia, Lag. (ægyptiaca).
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Aucheriana, *Boiss.* (1842), 155.
auriculæfolia, Pomel (gibraltarica).
avromana, *Boiss. & Haussk.* (1888), 255.
baïcalensis, Turcz. (tenuis).
Balansæ, *Boiss.* (1859), 270.
Barbeyana, *Heldr. MSS., ap. Boiss.* (1888), 160.
Bastardi, Bor. (maritima).
Baumgarteni, *Schott & Kotschy* (1868), 172.
Behen, *Linn.* (1753), 243.
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Boissieri, *J. Gay* (1850), 237.
Boissieri, Tineo (sericea).
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Bornmuelleri, *Freyn* (1891), 333.
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brachycarpa, *Boiss. & Bal.* (1859), 336.
brachypetala, *Rob. & Cast.* (1815), 54.
brachystachys, Webb (setacea).
brahuica, *Boiss.* (1867), 298.
brevicaulis, *Boiss.* (1842), 126.
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Burchellii, *Otth* (1824), 96.
burmanica, *Coll. & Hemsl.* (1890), 145.
cæsarea, *Boiss. & Bal.* (1859), 265.
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calycina, Salzm. (1868), 51.
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Campanula, *Pers.* (1805), 158.
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Campoi, Losc. (elegans).
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canariensis, *Willd.* (1822), 303.
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caramanica, *Boiss. & Heldr.* (1849), 256.
cariensis, *Boiss.* (1842), 220.
caryophylloides, Otth (stentoria).
caspica, *Pers.* (1805), 292.
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catholica, Willk. (italica).
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cisplatensis, *Cambess.* (1835), 76.
citrina, *Boiss.* (1888), 309.
clandestina, *Jacq.* (1796), 78.
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coarctata, Lag. (calycina).
colorata, Poir. (sericea).
commelinæfolia, *Boiss.* (1842), 122.
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corsica, Sang. (pendula).
crassicaulis, Willk. & Costa (nemoralis).
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debilis, Stapf (chætodonta).
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Douglasii, *Hook.* (1833), 281.
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Drummondii, A. Gray (Scouleri).
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echinus, *Boiss. & Heldr.* (1856), 110.
Ehrenbergiana, Rohrb. (longipetala).
elegans, *Link* (1804), 100.
Engelmanni, Rohrb. (Bridgesi).
eremitica, *Boiss.* (1867), 380.
eremophila, Bien. (sericea).
eriocalycina, *Boiss.* (1842), 291.
eriophora, Willd. (sericea).
erysimifolia, Stapf (persica).
euxina, Rupr. (dichotoma).
exaltata, Nees (sericea).
fabaria, *Sibth. & Sm.* (1806), 11.

fabarioides, *Haussk.* (1893), 16.
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Fenzlii, *Boiss. & Bal.* (1859), 369.
filipes, *Freyn & Sint.* (1895), 162.
fimbriata, *Sims* (1806), 29.
firma, Sieb. & Zucc. (aprica).
firmula, Herb. Lugd. Bat. (aprica).
fissipetala, Turcz. (Fortunei).
flammulæfolia, *Steud.* (1847), 177.
flavescens, *Waldst. & Kit.* (1804), 175.
fœtida, *Link* (1826), 167.
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foliosa, Regel (macrostyla).
Fortunei, *Vis.* (1847), 370.
Friwaldzkyana, *Hampe* (1837), 253.
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fruticulosa, Dietr. (caspica).
fruticulosa, *Sieb.* (1824), 161.
fuscata, *Link* (1804), 197.
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gallica, *Linn.* (1753), 48.
Gebleriana, *Schrenk* (1841), 322.
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Giraldii, *Guss.* (1855), 49.
glabrescens, *Coss.* (1890), 87.
glandulosa, Hampe (plutonica).
glareosa, *Jord.* (1851), 24.
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goniocaula, *Boiss.* (1842), 290.
gonocalyx, *Boiss.* (1842), 247.
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Grayi, *S. Wats.* (1879), 119.
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Guicciardii, Boiss. et Heldr. (Marschalli).
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Haussknechtii, *Held.* (1885, 1893), 230.
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hifacensis, *Rouy* (1885), 389.
hirsuta, *Lag.* (1805), 57.
hirsuta, Schousb. (disticha).
hirticalyx, *Boiss. & Haussk.* (1888), 293.
hispanica, Jacq. (sericea).
hispida, Willd. (disticha).
hispida, Salzm. (hirsuta).
Hochstetteri, *Rohrb.* (1867), 94.
holopetala, *Bunge* (1834), 319.
Holzmanni, *Heldr.* (1888), 244.
humilis, *C. A. Mey.* (1831), 117.
Hussoni, *Boiss.* (1849), 212.
imbricata, *Desf.* (1798), 77.
inaperta, *Linn.* (1753), 231.
inaperta, Linn. herb. (multicaulis).
incompta, A. Gray (Bridgesi).
incurvifolia, *Kar. & Kir.* (1841), 165.
infidelium, *Post* (1895), 147.
inflata, *Smith* (1800), 25.
insubrica, Gaud. (nutans).
insularis, *Barbey* (1885), 210.
integripetala, *Bory & Chaub.* (1832), 221.
intricata, *Post* (1895), 219.
intrusa, *Wight & Arn.* (1834), 102.
italica, *Pers.* (1805), 362.
italica, Poll. (nutans).
japonica, *Rohrb.* (1870), 181.
jucunda, Jord. & Fourr. (gallica).
juncea, *Sibth. & Sm.* (1806), 215.
juvenalis, *Delile* (1836), 34.
khasiana, *Rohrb.* (1869), 152.
Kotschyi, *Boiss.* (1842), 218.
Kremeri, *Soy.-Will. & Godr.* (1851), 194.
kubanensis, *Somm. & Lev.* (1893), 3.
kumaonensis, *Williams* (1896), 14.
kunawarensis, *Royle* (1839), 342.
Kuschakewiczi, *Regel & Schmalh.* (1877), 64.
laconica, *Boiss. & Orph.* (1859), 222.
lævigata, *Sibth. & Sm.* (1806), 236.
lagenocalyx, *Fenzl* (1867), 42.
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latifolia, S. F. Gray (S. Armeria).
laxa, *Boiss. & Kotschy* (1867), 266.
lazica, *Boiss.* (1842), 170.
legionensis, *Lag.* (1816), 91.
leptoclada, *Boiss.* (1867), 174.
leptopetala, *Schrenk* (1844), 294.
Lerchenfeldiana, *Baumg.* (1836), 187.
leucojifolia, Ors. (ciliata).
leucophylla, *Boiss.* (1842), 348.
libanotica, *Boiss.* (1849), 273.
ligulata, Viv. lusus 1 (setacea).
ligulata, Viv. lusus 2 (sericea).
linearis, *Decne.* (1835), 224.
lineata, *Boiss. & Buhse* (1860), 296.
linicola, *C. C. Gmel.* (1826), 245.
linifolia, *Sibth. & Sm.* (1806), 285.
lithophila, *Kar. & Kir.* (1842), 301.
littorea, *Brot.* (1804), 83.
livida, Wierzb. (viridiflora).
longicaulis, *Pourr.* (1803), 88.
longicilia, *Otth* (1824), 356.
longiflora, *Ehrh.* (1792), 263.

longipetala, *Vent.* (1800), 341.
longitubulosa, *Engl.* (1895), 134.
luisana, *S. Wats.* (1888), 376.
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Lyallii, *S. Wats.* (1875), 378.
lychnidea, *C. A. Mey.* (1831), 283.
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Macounii, *S. Wats.* (1891), 282.
macrodonta, *Boiss.* (1842), 41.
macronychia, *Boiss.* (1888), 179.
macropoda, *Velen.* (1886), 164.
macrosolen, *Steud.* (1847), 258.
macrostyla, Maxim. (foliosa).
Manissadjiani, *Freyn* (1895), 272.
maritima, *With.* (1796), 23.
maroccana *Coss.* (1890), 66.
Marschalli, *C. A. Mey.* (1831), 343.
masmenæa, *Boiss.* (1856), 104.
mauritanica, Pomel (obtusifolia).
Maximowicziana, *Rohrb.* (1870), 168.
megalocalyx, *Freyn* (1895), 260.
mekinensis, *Coss.* (1890), 208.
melandryiformis, Maxim. (aprica).
melandryoides, *Lange* (1878), 128.
mellifera, *Boiss. & Reut.* (1842), 351.
mentagensis, *Coss.* (1890), 106.
Menziesii, *Hook.* (1833), 183.
methanæa, Heldr. (rigidula).
Meyeri, Fenzl (depressa).
micropetala, *Lag.* (1816), 75.
microphylla, *Boiss.* (1842), 144.
microsperma, Fenzl (Kotschyi).
modesta, Jord. & Fourr. (gallica).
mogadorensis, *Coss.* (1875), 59.
mollissima, *Pers.* (1805), 387.
monantha, Boiss. & Haussk. (monerantha).
monantha, *S. Wats.* (1875), 12.
monerantha, *Williams* (1896), 176.
mongolica, *Maxim.* (1889), 13.
montana, Arrand. (maritima).
Montbretiana, *Boiss.* (1842), 297.
Moorcroftiana, *Hook. f. & Thoms.* (1868), 124.
multicaulis, Durand (Bridgesi).
multicaulis, *Guss.* (1826), 163.
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multicaulis, Nutt. (Douglasii).
multifida, Rohrb. (fimbriata).
multiflora, *Pers.* (1805), 323.
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Mundiana, *Eck. & Zey.* (1835), 99.
muscipula, *Linn.* (1753), 239.
myloptera, Jord. & Fourr. (gallica).
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nardifolia, Boiss. (subulata).
nemoralis, *Waldst. & Kit.* (1812), 364.
nevadensis, *Boiss.* (1845), 372.
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nocturna, Pall. (dichotoma).
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nurensis, *Boiss. & Haussk.* (1888), 156.
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odoratissima, *Bunge* (1834), 307.
Oldhamiana, Miq. (aprica).
Olgæ, *Rohrb.* (1870), 330.
oligantha, *Boiss. & Heldr.* (1854), 276.
Oliveriana, Otth (sericea).
olympica, *Boiss.* (1842), 314.
oreophila, *Boiss.* (1867), 154.
oropediorum, *Coss.* (1890), 74.
Orphanidis, *Boiss.* (1867), 115.
Orsiniana, Reichb. (ciliata).
Otites, *Smith* (1800), 317.
otodonta, *Franch.* (1886), 358.
ovata, *Pursh* (1814), 371.
oxyodonta, *C. & W. Barbey* (1882), 68.
pachyrrhiza, *Franch.* (1886), 329.
palæstina, *Boiss.* (1849), 60.
palinotricha, *Fenzl* (1867), 131.
papillifolia, *Williams* (1896), 142.
papillosa, *Boiss.* (1842), 249.
paradoxa, *Linn.* (1763), 390.
Parrowiana, *Boiss. & Haussk.* (1888), 261.
parviflora, Turcz. (tenuis).
parvula, *Coss.* (1890), 136.
patula, Lag. (segetalis).
pauciflora, *Salzm.* (1824), 384.
pauciflora, Tornab. (italica).
pectinata, *S. Wats.* (1875), 377.
peduncularis, *Boiss.* (1842), 267.
pendula, *Linn.* (1753), 81.
pentelica, *Boiss.* (1849), 229.
perfoliata, Otth (chloræfolia).
permixta, Jord. (brachypetala).
pernoctans, Link (sericea).
persica, *Boiss.* (1842), 125.
petræa, *Adams* (1805), 295.
pharnaceifolia, *Fenzl* (1842), 310.
phrygia, *Boiss.* (1867), 379.
physalodes, *Boiss.* (1849), 28.
picta, Pers. (juncea).
pilosa, Pourr. (sericea).
pilosa, Willd. (disticha).

piloselloides, G. Don (Burchellii).
pindicola, *Haussk.* (1887), 112.
pinetorum, *Boiss. & Heldr.* (1849), 227.
plutonica, *Naud.* (1845), 10.
polygama, Stokes (Saxifraga).
polytrichoides, Zumagl. (acaulis).
Pomeli, Battand. (imbricata).
pompeiopolitana, *J. Gay* (1867), 58.
portensis, *Linn.* (1753), 216.
Porteri, *Post* (1888), 139.
primulæflora, *Eck. & Zey.* (1835), 97.
Pringlei, *S. Wats.* (1888), 346.
procumbens, *Murr.* (1786), 20.
pruinosa, *Boiss.* (1842), 335.
psammitis, *Link* (1820), 84.
Pseudo-Atocion, *Desf.* (1798), 198.
Pseudo-Behen, Heldr. (Reinholdi).
Pseudo-Behen, Schur (inflata).
pseudo-nutans, *Panc.* (1883), 363.
pseudotites, Rota (Otites).
pteroneura, *Williams* (1886, 1896), 248.
puberula, Bert. (sericea).
puberula, *Boiss.* (1867), 339.
pumila, St. Lag. (Pumilio).
Pumilio, *Wulf.* (1778), 21.
punctata, Bub. (elegans).
pungens, *Boiss.* (1842), 1.
purpurata, Greene (Scouleri).
pygmæa, *Adams* (1805), 133.
pygmæa, Herd. (gallica).
pygmæa, Less (? caspica).
pyrenaïca, Pourr. (sericea).
pyriformis, Coss. (glauca).
quinquevulnera, Linn. (gallica).
racemosa, *Otth* (1824), 45.
Raddeana, Trautv. (odontopetala).
radicosa, *Boiss. & Heldr.* (1845), 274.
ramosissima, *Desf.* (1798), 192.
reflexa, *Aiton* (1813), 52.
Reichenbachii, *Vis.* (1852), 284.
Reinholdi, *Heldr.* (1874), 240.
remotiflora, *Vis.* (1852), 55.
repens, Boiss. (tenuis).
repens, Eichw. (caucasica).
repens, *Patr.* (1805), 331.
reticulata, *Desf.* (1798), 217.
reticulata, Link (juncea).
retroflexa, Steud. (ægyptiaca).
Reuteriana, *Boiss. & Blanche* (1856), 190.
rhodopea, *Janka* (1878), 373.
rhynchocarpa, *Boiss.* (1842), 107.
rigidula, *Sibth. & Sm.* (1806), 213.
Roemeri, *Friw.* (1836), 313.
Rohrbachiana, Aschers. (Ungeri).
rosulata, *Soy.-Will. & Godr.* (1851), 386.
Rouyana, *Battand.* (1888), 257.
rubella, *Brot.* (1804), 200.
rubella, *Linn.* (? ? agg.).
rubella, Soy.-Will. & Godr. (segetalis).
rupestris, *Linn.* (1762), 182.
rupestris, Schur (Lerchenfeldiana).
Salzmanni, *Badaro* (1826), 384.
Sargenti, *S. Wats.* (1879), 116.
Sartorii, *Boiss. & Heldr.* (1856), 36.
saxatilis, *Sims* (1803), 344.
saxicola, Rouy (sericea).
Saxifraga, *Linn.* (1753), 159.
Saxifraga, Thunb. (gracillima).
scabrida, *Soy.-Will. & Godr.* (1851), 73.
scaposa, *B. L. Robinson* (1893), 288.
Schafta, *Gmel.* (1838), 132.
schirensis, Rohrb. (chirensis).
Schlosseri, Vukot. (Sendtneri).
Schlumbergeri, *Boiss.* (1888), 123.
Schmuckeri, *Wettst.* (1892), 151.
Schwarzenbergeri, *Halacsy* (1894), 368.
Schweinfurthi, *Rohrb.* (1867), 69.
Scouleri, *Hook.* (1833), 347.
sedoides, *Poir.* (1796), 228.
segetalis, *Duf.* (1860), 203.
Semenovii, *Regel & Herd.* (1866), 306.
Sendtneri, *Boiss.* (1867), 316.
sericea, *All.* (1785), 85.
serrulata, *Boiss.* (1867), 269.
sersuensis, Pomel (inflata).
sessiliflora, Poir. (racemosa).
setacea, *Viv.* (1824), 65.
sibirica, *Pers.* (1805), 320.
Sibthorpiana, Reichb. (racemosa).
sicula, Cyr. (sedoides).
sicula, Ker (sericea).
Sieberi, *Fenzl* (1842), 367.
sinaïca, Boiss. (odontopetala).
sinensis, Hook. (Fortunei).
sisianica, *Boiss. & Buhse* (1860), 149.
Skorpili, *Velen.* (1889), 374.
Spaldingii, *S. Wats.* (1875), 359.
spergulifolia, *Bieb.* (1819), 332.
spinescens, *Sibth. & Sm.* (1806), 365.
splendens, *Boiss.* (1867), 361.
squamigera, *Boiss.* (1842), 251.
staticifolia, *Sibth. & Sm.* (1806), 264.
stellata, *Aiton* (1812), 354.
stenobotrys, *Boiss. & Haussk.* (1867), 305.
stenophylla, Plan. (maritima).
stentoria, *Fenzl* (1842), 108.
striata, *Rohrb.* (1867), 226.
stricta, Achar. (segetalis).
stricta, *Linn.* (1756), 241.
struthioloides, *A. Gray* (1854), 271.
subconica, *Friw.* (1835), 33.
subulata, *Boiss.* (1842), 111.

subuniflora, *Somm. & Lev.* (1893), 4.
succulenta, *Forsk.* (1775), 140.
Suksdorfii, *B. L. Robinson* (1891), 121.
supina, Auch.-Eloy (stenobotrys).
supina, *Bieb.* (1819), 334.
tachtensis, *Franch.* (1883), 118.
Tanakæ, *Maxim.* (1888), 366.
tarbagataica, Kryl. (? ? tenuis).
tatarica, *Pers.* (1805), 278.
Tatarinowii, *Regel* (1861), 185.
tenella, *C. A. Mey.* (1831), 302.
tenuicaulis, *Freyn & Bornm.*, 259.
tenuiflora, *Guss.* (1826), 246.
tenuis, *Willd.* (1809), 280.
thebana, *Orph.* (1867), 15.
thessalonica, *Boiss. & Heldr.* (1854), 178.
Thirkeana, C. Koch (racemosa).
Thorei, *Duf.* (1825), 22.
Thunbergiana, Eck. & Zey. (Burchellii).
thymifolia, *Sibth.* & *Sm.* (1806), 143.
Tommasinii, Willk. (sedoides).
tragacantha, *Fenzl* (1867), 109.
tridentata, Boiss. (cerastioides).
tridentata, Desf. (calycina).
trinervia, *Seb. & Mauri* (1818), 72.
tubiflora, Duf. (sericea).
tunicoides, *Boiss.* (1842), 275.
turbinata, *Guss.* (1827), 202.
turgida, *Bieb.* (1835), 287.
turkestanica, Regel (incurvifolia).
Uhdeana, *Rohrb.* (1867), 141.
undulata, Pourr. (segetalis).
Ungeri, *Fenzl* (1862), 233.
Urvillei, *Schott* (1822), 299.
vagans, *C. B. Clarke* (1889), 153.
vallesia, *Linn.* (1762), 130.
vallesiaca, Link (nicæensis).
variegata, *Boiss. & Heldr.* (1849), 18.
velutinoides, *Pomel* (1874), 357.
verecunda, S. Wats. (Behrii).
vesiculifera, *J. Gay* (1867), 252.
vespertina, Curt. (sericea).
vespertina, *Retz.* (1779-91), 46.
villosa, *Forsk.* (1775), 80.
virescens, *Coss.* (1890), 206.
virgata, Stapf (pruinosa).
viridella, Link (nutans).
viridiflora, *Linn.* (1762), 350.
vulgaris, Garcke (inflata).
Watsoni, *B. L. Robinson* (1893), 120.
Willkommiana, J. Gay (divaricata).
xylobasis, *Freyn* (1895), 113.
yemensis, *Defl.* (1889), 180.
yunnanensis, *Franch.* (1886), 328.

LICHENES COLENSOANI a Reverendiss. Colenso in Novâ Zelandiâ septentrionali prope Napier lecti, et nuperius missi, in Herbario Reg. Kewensi servati, quos determinavit Dr. J. MUELLER [Argoviensis]. (Communicated with the sanction of W. T. THISELTON DYER, C.M.G., C.I.E., F.R.S., F.L.S.)

[Read 21st March, 1895.]

Obs. Quoad characteres ordinum, tribuum et generum conf. ad Mueller Arg. Consp. syst. Lich. Nov. Zelandiae in Bulletin de l'Herbier Boissier, vol. ii. App. I. (1894).

Lichenes pro Novâ Zelandiâ novi asterico designati sunt.

Ordo I. COLLEMACEÆ.

Trib. COLLEMEÆ.

1. LEPTOGIUM PHYLLOCARPUM, Mont. f. ISIDIOSA, *Muell. Arg. in Bull. Herb. Boiss.*, ii. App. I. p. 18.—*Colenso*, 1534, 1816.

2. LEPTOGIUM TREMELLOIDES, *Fr. H. Scan.*, p. 293.—*Colenso*, 1631.

—— —— v. AZUREUM, *Nyl.*, *Syn.*, p. 125.—*Colenso*, 1657, 1810, 1815.

—— —— v. PICHNEUM, *Nyl.*, *Lich. Nov. Zel.*, p. 10.—*Colenso*, 1597.

* —— —— v. LACINIATUM, *Tuckerm. in Proc. Am. Acad.*, vii. (1868) p. 234.—*Colenso*, 1638.

*3. LEPTOGIUM PECTEN, *F. Wils. in Journ. Linn. Soc.* (*Bot.*), xxviii. (1891) p. 358.—*Colenso*, 1630, 1644 (ambo sterilia).

4. LEPTOGIUM DENDROIDES, *Nyl. in Flora*, xix. (1867) p. 438; *Dendriscocaulon filicinellum*, Nyl., Lich. Nov. Zel., p. 10. —*Colenso*, 1646, 1702.

*5. COLLEMA FURVUM, *Ach.*, *Lichenog. Univ.*, p. 650.—*Colenso*, 1501, 1523 (specim. sterilia).

—— —— v. MICROPHYLLIMUM, *Muell. Arg. in Bull. Soc. Bot. Belg.*, xxxi. (1892) p. 22.—*Colenso*, 1563.

6. COLLEMA SUBCONVENIENS, *Nyl.*, *Lich. Nov. Zel.*, p. 8. Ad cortices et ramulos et inter muscos.—*Colenso*, 1519, 1569, 1629, 1643, 1669 (magis pulviniforme), 1743, 1777.

7. COLLEMA PULPOSUM, *Ach.*, *Syn. Lich.*, p. 311.—*Colenso*, 1541.

8. SYNECHOBLASTUS LEUCOCARPUS, *Muell. Arg. in Flora*, lxv. (1882) p. 294, sub n. 379.—*Colenso*, 1634.

9. SYNECHOBLASTUS AGGREGATUS, *Th. M. Fries*, *Lich. Arct.*, p. 280.—*Colenso*, 1525, 1604, 1609, 1645, 1647, 1708, 1760.

—— —— v. COLENSOI, *Muell. Arg.; Collema fasciculare* v. *Colensoi*, Ch. Bab. in Hook. f., Fl. N. Zel., ii. 309. Thallus pulvinatus, crassulus, plicato-rugulosus, e plumbeo fuscus, praesertim e lobis erectis, confertis, convolutis et crispis apice dense fertilibus formatus.—*Colenso*, 1539, 1696.

10. SYNECHOBLASTUS LÆVIS, *Muell. Arg. in Flora*, lxx. (1887) p. 283, n. 1127.—*Colenso*, 1522, 1575, 1642.

11. SYNECHOBLASTUS FLACCIDUS, *Koerb. Syst.*, p. 413; corticola, *Colenso*, 1694 (pulchre fertilis, levis).

Ordo II. EPICONIACEÆ.

Trib. SPHÆROPHOREÆ.

12. SPHÆROPHORON TENERUM, *Laur. in Linnœa*, ii. (1827) p. 45, t. 1, fig. 4.—*Colenso*, 1732.

13. SPHÆROPHORON COMPRESSUM, *Ach.*, *Meth.*, p. 135.—*Colenso*, 1711 pr. p.

* —— —— v. CANDIDUM, *Muell. Arg. in Flora*, lxiv. (1881) p. 505.—*Colenso*, 1686.

14. SPHÆROPHORON AUSTRALE, *Laur. in Linnœa*, ii. (1827) p. 44.—*Colenso*, 1509, 1510, 1515, 1516, 1555, 1612, 1636, 1637, 1682, 1683, 1684, 1685, 1687, 1689, 1691, 1697, 1698, 1711 pr. p., 1712, 1713, 1731.

Trib. CONIOPHYLLEÆ.

15. CONIOPHYLLUM COLENSOI, *Muell. Arg. in Bull. Soc. Bot. Belg.*, xxxi. (1892) p. 23.—*Colenso*, 1651.

Ordo III. DISCOCARPEÆ.

Ser. I. *DIPLOBLASTÆ.*

Trib. STEREOCAULEÆ.

16. STEREOCAULON RAMULOSUM, *Ach., Meth.,* p. 314.—*Colenso,* 1620, 1709.

* —— —— v. NUDATUM. *St. proximum* v. *nudatum, Muell. Arg. in Flora,* lxix. (1886) p. 253.—*Colenso,* 1735.

17. CORYNOPHORON COLENSOI, *Nyl., Lich. Nov. Zel.,* p. 15.—*Colenso,* 741.

Trib. CLADONIEÆ.

18. CLATHRINA AGGREGATA. *Muell. Arg. in Flora,* lxvi. (1883) p. 80.—*Colenso,* 1511, 1512, 1517, 1536, 1567, 1618, 1670, 1779, 1784, 1785, 1788, 1807.

* —— —— v. STRAMINEA, *Muell. Arg., l.c.,* lxii. (1879) p. 162. —*Colenso,* 1591.

19. CLADONIA CAPITELLATA, *Ch. Bab. in Hook. f., Fl. N. Zel.,* ii. 296.—*Colenso,* 1736.

*20. CLADONIA FURCATA v. ASPERATA, *Muell. Arg. in Flora,* lxv. (1882) p. 295.—*Colenso,* 1661, 1786, 1787, 1795.

—— —— v. ADSPERSA, *Floerke, Deutsch. Lich.,* n. 198.—*Colenso,* 1581.

* —— —— v. FARINACEA, *Wainio, Monogr. Cladon.,* p. 339 (sub formâ).—*Colenso,* 1803.

* —— —— v. GRACILLIMA, *Muell. Arg. in Flora,* lxv. (1882) p. 296.—*Colenso,* 1738.

*21. CLADONIA SQUAMOSA v. ASPERELLA, *Floerke, Cladon.,* p. 132. —*Colenso,* 1580.

22. CLADONIA DEGENERANS v. HAPLOTEA, *Floerke, Cladon.,* p. 42. —*Colenso,* 1809.

* —— —— v. JAVANICA, *Muell. Arg. in Flora,* lxv. (1882) p. 294.—*Colenso,* 1567 pr. p.

23. CLADONIA PITYREA, *Floerke, Cladon,* p. 79.—*Colenso,* 1551, 1552, 1553, 1554, 1623, 1625, 1648, 1695, 1714, 1805, 1806 pr. p., 1808.

*24. CLADONIA FIMBRIATA v. ABORTIVA, *Rabenh., Deutsch. Krypt.,* p. 108.—*Colenso,* 1553.

* CLADONIA FIMBRIATA v. DENDROIDES, *Flot., Lich. Siles.*, p. 33. —*Colenso*, 1802, 1806.

25. CLADONIA PYXIDATA, *Fr., Lich. Eur.*, p. 216.—*Colenso*, 1621, 1622, 1624.

* —— —— v. COSTATA, *Floerke, Cladon.*, p. 66.—*Colenso*, 1579, 1582, 1583, 1584, 1804.

*26. CLADONIA PLEUROTA, *Schaer., Enum.*, p. 186.—*Colenso*, 1550, 1666, 1796.

27. CLADONIA MACILENTA, *Hoffm., Fl. Germ.*, p. 126.—*Colenso*, 1739.

Trib. BÆOMYCEÆ.

28. BÆOMYCES FUNGOIDES, *Ach., Meth.*, p. 320.—*Colenso*, 1817.

29. BÆOMYCES HÆMOTROPUS, *Leight. in Journ. Linn. Soc. (Bot.)*, x (1867), p. 31, t. 4, fig. 1.—*Colenso*, 1716, 1717, 1718, 1719, 1720.

Ser. II. *THAMNO-PHYLLOBLASTÆ.*

Trib. USNEEÆ.

30. USNEA BARBATA v. FLORIDA, *Fr., Lich. Europ.*, p. 18.—*Colenso*, 1559.

—— —— v. RUBIGINEA, *Mey. et Flot. in Act. Acad. Nat. Cur.*, xix. I. p. 210.—*Colenso*, 1794.

* —— —— v. PENDULA, *Koerb., Parerga*, p. 1.—*Colenso*, 1558.

* —— —— v. SOREDIOSULA, *Muell. Arg. in Engl. Jahrb.*, xx. (1894) p. 245.—*Colenso*, 1797.

*31. USNEA MELAXANTHA v. SOREDIIFERA. *Neuropogon melaxanthus* v. *sorediifera*, Cromb. in Journ. Linn. Soc. (Bot.), xv. (1876) p. 182.—*Colenso*, 1776.

Trib. RAMALINEÆ.

32. RAMALINA ECKLONI v. MEMBRANACEA, *Muell. Arg. in Flora*, lxvii. (1884) p. 619. Specimina (ramillicolæ) pygmæa, tantum 6–10 mm. longa, ambitu et consistentiâ nec non apotheciis et sporis bene congruentia.—*Colenso*, 1733, 1737.

33. ANAPTYCHIA LEUCOMELÆNA, *Wainio, Étude*, i. p. 128.—*Colenso*, 1610.

Sect. PELTIGEREÆ.

34. PELTIGERA PUSILLA, *Koerb.*, *Syst.*, p. 59.—*Colenso*, 1611.

35. PELTIGERA POLYDACTYLA, *Hoffm.*, *Flor. Germ.*, p. 106, f. MINOR, *Krempelh.*, *Lich. Novara*, p. 121.—*Colenso*, 1590, 1594, 1703.

* —— —— v. SCUTATA, *Nyl.*, *Syn. Lich.*, p. 327.—*Colenso*, 1658.

* —— —— v. DOLICHORRHIZA, *Nyl.*, *Syn. Lich.*, p. 327.—*Colenso*, 1513, 1568, 1617, 1618, 1635, 1671, 1704, 1751.

Trib. PARMELIEÆ.

36. STICTINA FULIGINOSA, *Nyl.*, *Syn. Lich.*, p. 347.—*Colenso*, 1531, 1588, 1710, 1747, 1812.

*37. STICTINA INTRICATA, *Nyl.*, *Syn. Lich.*, p. 334.—*Colenso*, 1596.

—— —— v. THOUARSII, *Nyl.*, *l.c.*, p. 335.—*Colenso*, 1692, 1707, 1759.

38. STICTINA CINNAMOMEA, *Muell. Arg. in Flora*, lxvi. (1883) p. 22.—*Colenso*, 1674, 1758, 1783 pr. p.

39. STICTINA CROCATA, *Nyl.*, *Syn. Lich.*, p. 338.—*Colenso*, 1593.

40. STICTINA MOUGEOTIANA, *Nyl.*, *l.c.*, p. 340 (v. XANTHOLOMA, *Nyl.*, *l.c.*, p. 341).—*Colenso*, 1545.

*41. STICTINA SCROBICULATA, *Nyl.*, *Consp. Stict.*, p. 6, n. 33.—*Colenso*, 1752 pr. p.

*42. STICTINA DICTYOPHORA, *Muell. Arg.*; thallus circ. 2–3 centim. latus et minor, horizontalis, lacinioso-divisus, laciniæ breviuscule lobatæ, crenatæ, totus tenuis, firmus utraque pagina levis, supra plumbeo-fuscescens, subpolitus nitidulus, hinc inde minute isidiosus, subtus pallidus et indumento nigro-fusco subsparso v. demum distincte rhomboareolato præditus; cyphellæ nullæ; gonimia *Stictinæ*; apothecia ignota.—Est species insignis et sterilis tantum nota, nulli cognitarum, nisi *Stictinæ retigeræ*, Muell. Arg. in Flora, lxi. (1878) p. 484, leviter accedens, sed toto habitu, tenuitate, colore plumbeo, thallo non bulloso-gibboso bene diversa. A *Riccasoliis* Nyl. jam gonimiis distat. Etiam ad *Nephromium Lyallii* Ch. Bab. habitu et gonimiis accedit, sed thallus peculiariter vestitus est.—*Colenso*, 1772.

43. Sticta latifrons v. Menziesii, *Ch. Bab. in Hook. f., Fl. Nov. Zel.*, ii. p. 277.—*Colenso*, 1655, 1754, 1767, 1780, 1783 pr. p., 1811.

44. Sticta Filix, *Hoffm., Lichen.*, t. 55.—*Colenso*, 1726, 1744.

45. Sticta lacera, *Muell. Arg. in Flora*, lxxi. (1888) p. 131.—*Colenso*, 1586, 1589, 1690, 1799.

*46. Sticta sinuosa v. subcaperata, *Muell. Arg.*; *Sticta subcaperata*, Nyl. Lich. Nov. Zel., p. 31.—*Colenso*, 1530, 1570, 1607, 1614.

* —— —— v. caperata; *Sticta damæcornis* v. *caperta*, Nyl., Syn. Lich., p. 357.—*Colenso*, 1535, 1770.

47. Sticta variabilis, *Ach., Lich. Univ.*, p. 455.—*Colenso*, 1608.

48. Sticta psilophylla, *Muell. Arg. in Bull. Soc. Bot. Belg.*, xxxi. ii. (1892), p. 29.—*Colenso*, 1755.

49. Sticta episticta, *Nyl., Lich. New Zeal.*, p. 248, n. 17.—*Colenso*, 1771.

50. Sticta subcoriacea, *Nyl. in Flora*, xlviii. (1865) p. 298.—*Colenso*, 1507, 1706, 1752.

*51. Sticta Freycinetii, *Delise, Stict.*, p. 124, t. 14, fig. 51.—*Colenso*, 1715.

52. Sticta subvariabilis, *Nyl. in Flora*, l. (1867) p. 439.—*Colenso*, 1616, 1792.

53. Sticta Richardi, *Mont. in Ann. Sc. Nat.*, Sér. II. iv. (1835) p. 89.—*Colenso*, 1742, 1756, 1766, 1793.

—— —— v. rufovirescens, *Ch. Bab. in Hook. f., Fl. N. Zel.*, ii. p. 278.—*Colenso*, 1781.

54. Sticta Billardieri, *Delise, Stict.*, p. 99, t. 8, fig. 35.—*Colenso*, 1574, 1721, 1722, 1725, 1757, 1761, 1764.

55. Sticta granulata, *Ch. Bab. in Hook. f., Fl. N. Zel.*, ii. p. 281.—*Colenso*, 1773.

56. Sticta pubescens, *Muell. Arg. in Bull. Soc. Bot. Belg.*, xxxi. ii. (1892) p. 28.—*Colenso*, 1672.

57. Sticta orygmæa, *Ach., Meth.*, p. 278.—*Colenso*, 1724, 1749, 1753, 1765, 1768 (ster.), 1769, 1782, 1813.

58. Sticta endochrysea v. flavicans, *Muell. Arg. in Flora*, lxxi. (1888) p. 136.—*Colenso*, 1746, 1783 pr.p.

59. Sticta Montagnei, *Ch. Bab. in Hook. f., Fl. N. Zel.*, ii p. 284; *Ricasolia Montagnei*, Nyl., Syn. Lich., p. 373.—*Colenso*, 1527.

*60. Parmelia perlata v. ciliata, *DC.*, f., sorediifera, *Muell. Arg. in Flora*, lxxiv. (1891) p. 382.—*Colenso*, 1500, 1520.

61. PARMELIA CETRATA, *Ach. Syn.*, p. 198.—*Colenso*, 1727.

*62. PARMELIA PHYSODES v. PULVERATA, *Muell. Arg. in Flora*, lxvi. (1883) p. 76.—*Colenso*, 1791.

* —— —— v. SOLUTA, *Muell. Arg.*, *l.c.*—*Colenso*, 1762.

* —— —— v. LUGUBRIS, *Nyl.*, *Enum. Gén.*, p. 104.—*Colenso*, 1745.

63. PARMELIA PERTRANSITA, *Stirt. in Proc. Phil. Soc. Glasg.*, x. (1877) p. 294.—*Colenso*, 1602.

64. ANZIA ANGUSTATA, *Muell. Arg. in Flora*, lxxii. (1889) p. 507. —*Colenso*, 1560.

65. XANTHORIA PARIETINA v. SPINULOSA, *Muell. Arg. in Bull. Herb. Boiss.*, ii. App II. (1894) p. 40.—*Colenso*, 1632 (specimina ad modium juvenilia).

66. PSEUDOPHYSCIA SPECIOSA v. HYPOLEUCA f. SOREDIIFERA, *Muell. Arg.*, *l.c.*—*Colenso*, 1728.

Trib. PSOROMEÆ.

67. PSOROMA ARANEOSUM, *Nyl.*, *Syn. Lich.*, ii. p. 23.—*Colenso*, 1626, 1656, 1688.

68. PSOROMA SPHINCTRINUM, *Nyl.*, *Enum. Gén.*, p. 108.—*Colenso*, 1526, 1540, 1542, 1546 bis, 1562, 1592, 1633, 1667, 1748, 1798.

—— —— v. DISCRETUM, *Nyl.*, *Syn. Lich.*, ii. p. 25.—*Colenso*, 1633 pr. min. p.

—— —— v. PHOLIDOTOIDES, *Nyl.*, *Lich. Nov. Zel.*, p. 52.—*Colenso*, 1663, 1814.

*69. PSOROMA ASPERELLUM, *Nyl. ap. Cromb. in Journ. Linn. Soc.* (*Bot.*), xvii. (1879) p. 398.—*Colenso*, 1564, 1565, 1595, 1699, 1763 (in meo specim. Hampeano *Lecanoræ asperellæ* Hampe, sched. locus indicatus est: Australia felix (nec Promontorium Bonæ Spei).

Trib. PANNARIEÆ.

*70. PANNARIA FULVESCENS, *Nyl.*, *Enum. Gén.*, p. 109.—*Colenso*, 1534 pr. p.

71. PANNARIA IMMIXTA v. GYRANTHA, *Nyl.*, *Lich. Nov. Zel.*, p. 49.—*Colenso*, 1659.

*72. PANNARIA GRANULIFERA, *Muell. Arg.*; thallus cinereo-luridus, squamulosus, hypothallo nigro instratus; squamulæ dense discretæ, adpressæ, subrosulares, laciuioso-lobatæ, crenatæ, mox adscendentes, imbricatæ, demum conglobatæ, superficie integræ; apothecia $\frac{7-13}{10}$ mm. lata, plana, margine thallino valide granuloso et radiatim subplicato cincta; discus carneus nudus; sporæ et gonimia generis.—Est proxima *P. intermixtæ* Nyl. et ej. varietati *gyranthæ* Nyl., sed thallus aliter coloratus, mox imbricato-squamulosus et margo thallinus apotheciorum crassior et graniferus. Apothecia ut in laudatâ var. *gyrantha* subinde ambitu irregularia, reniformia et plicatula.—Corticola, *Colenso*, 1652.

*73. PANNARIA IMBRICATULA, *Muell. Arg. in Flora*, lxiv. (1881) p. 507.—*Colenso*, 1561.

Trib. PARMELIELLEÆ.

74. PARMELIELLA GAYANA, *Muell. Arg. in Flora*, lxix. (1886) p. 286, sub. n. 1021.—*Colenso*, 1740 pr. p.

75. PARMELIELLA TRIPTOPHYLLA, *Muell. Arg. in Mém. Soc. Phys. Genève*, xvi. (1862) p. 378.—*Colenso*, 1571.

76. COCCOCARPIA AURANTIACA, *Mont. et v. d. Bosch, in Miq. Pl. Jungh.*, p. 465.—*Colenso*, 1668.

* —— —— v. FURFURACEA, *Muell. Arg. in Flora*, lxv. (1882) p. 326.—*Colenso*, 1740.

Trib. PHYLLOPSOREÆ.

77. PHYLLOPSORA PARVIFOLIA, *Muell. Arg. in Bull. Herb. Boiss.*, ii. App. I. (1894) p. 45.—*Colenso*, 1653.

Ser. III. *KRYOBLASTÆ.*

Trib. LECANOREÆ.

78. LECANORA ATRA, *Ach., Lichenog. Univ.*, p. 344.—*Colenso*, 1508, 1549, 1627.

79. LECANIA BABINGTONII, *Muell. Arg. in Bull. Herb. Boiss.*, ii. App. I. (1894) p. 50.—*Colenso*, 1677.

80. MYXODICTYON CHRYSOSTICTUM, *Massal., Esam. Compar.*, p. 10. —*Colenso*, 1503, 1521, 1547, 1587, 1662, 1679, 1681.

81. PERTUSARIA SUBVAGINATA, *Nyl. in Flora.*, xlix. (1866) p. 290. —*Colenso*, 1538.

82. Pertusaria creberrima, *Stirt. ex Muell. Arg. in Bull. Herb. Boiss.*, ii. App. i. (1894) p. 53.—*Colenso*, 1543.

83. Phlyctella neozelandica, *Nyl.*, *Lich. Nov. Zel.*, p. 72.—*Colenso*, 1502, 1505, 1577, 1673, 1675, 1680, 1800.

Trib. Lecideeæ.

84. Lecidea cinnabarina, *Sommerf.*, *Suppl. Fl. Lapp.*, p. 170.—*Colenso*, 1650.

*85. Lecidea bacidioides, *Muell. Arg. in Flora.*, lxv. (1882) p. 486.—*Colenso*, 1649.

*86. Lecidea coarctata, Nyl. v. decipiens, *Muell. Arg.*; thallus minute squamulosus, subnullus; apothecia testaceo-rosea, ambitu pallida, subundulata, 1½ mm. lata, squamulas parvulas *Psoræ decipientis* Hoffm. optime simulantia.—*Colenso*, 1693.

*87. Lecidea parasema, *Nyl.*, *Lich. Scand.*, p. 216.—*Colenso*, 1585.

88. Lecidea crustulata, *Koerb.*, *Syst.*, p. 249.—*Colenso*, 1720.

*89. Patellaria (s. Biatorina) variegata, *Muell. Arg.*; thallus albidus, minute subsparso-granularis, demum evanescens; hypothallus albus, verniceo-levis; apothecia ½–⅘ mm. lata, plana, tenuiter marginata, gilvo-carnea, obsolete cæsio-pruinosa aut nuda, demum præsertim in margine v. etiam undique sensim nigrescenti-obscurata; lamina apotheciorum pallidorum undique hyalina; paraphyses conglutinatæ; sporæ in ascis angustis biseriatim 8-nae, cylindrico-ellipsoideæ, 8–10 μ longæ, 2½–3 μ latæ.—Juxta *P. subcarneam*, Muell. Arg., locanda est, extus tamen etiam *P. cæsio-pallentem*, Muell. Arg., refert, sed hæc longius distat margine apotheciorum crassiore et sporis multo majoribus. Apothecia colore valde ludunt.—Corticola, *Colenso*, 1578.

90. Patellaria melaclina, *Muell. Arg. in Bull. Herb. Boiss.*, i. (1893) p. 48; *Lecidea melaclina*, Nyl., Lich. Nov. Zel., p. 88.—*Colenso*, 1504, 1532, 1600.

91. Patellaria marginiflexa, *Muell. Arg. in Flora*, lxxi. (1888) p. 539; *Lecidea marginiflexa*, Hook. f. et Tayl. in Hook., Lond. Journ. Bot., iii. (1844) p. 638.—*Colenso*, 1514, 1548, 1639.

92. Patellaria millegrana, *Muell. Arg. in Flora*, lxiii. (1880) p. 280, sub n. 204.—*Colenso*, 1678, 1734.

93. Patellaria melasema, *Muell. Arg. in Bull. Herb. Boiss.*, ii. App I. (1894) p. 69.—*Colenso*, 1566.

*94. Blastenia Colensoi, *Muell. Arg.*; thallus persicinus, in hypothallo cæsio-albo tenuissimo instratus, tenuissime elato-granulosus, granula circ. $\frac{5}{100}$ mm. lata, vulgo plurima in glebulas circ. $\frac{1}{4}$ mm. latas dense conglobata; apothecia $\frac{1}{4}$–1 mm. lata, sessilia, plana, demum margine undulata, intense sanguineo-punicea; margo concolor, tenuis et leviter prominens; lamina hyalina; sporæ 8-nae, circ. 13 μ longæ, $7\frac{1}{2}$ μ latæ.—Est species elegans, affinis australiensi, *Bl. pulcherrimæ*, Muell. Arg. in Flora, lxxi. (1888) p. 141, ubi apothecia obscuriora et thallus alius.—Ad lapillos feldspathicos.—*Colenso*, 1729.

*95. Lopadium ferrugineum, *Muell. Arg. in Nuovo Giorn. Bot. Ital.*, xxiii. (1891) p. 127.—*Colenso*, 1556.

Trib. Biatorinopsideæ.

96. Biatorinopsis lutea, *Muell. Arg. in Flora*, lxiv. (1881) p. 102.—*Colenso*, 1660.

*97. Biatoridium neozelandicum, *Muell. Arg.*; thallus olivaceo-nigricans, tenuissimus, madefactus mollis; gonimia gloeo-capsoideo-composita, demum in filamenta moniliformia soluta, olivacea, diametro $3\frac{1}{2}$ μ equantia, membrana indistincta; apothecia sessilia, plana, demum $\frac{2}{3}$ mm. lata, juniora duplo et pluries minora, nonnihil gyalectoideo-concava, nuda, margine proprio pallidiore obsolete prominulo cincta; epithecium hyalino-fuscidulum; hypothecium leviter obscuratum; paraphyses capillares, facile liberæ; asci angusti, circ. 50–80-spori; sporæ varie ellipsoideæ, circ. 7–$8\frac{1}{2}$ μ longæ et 4–5 μ latæ.—Corticola: *Colenso*, 1640.—Obs. Hoc. genus ob structuram gonimiorum ad *Biatorinopsideas* pertinet.

Trib. Byssocauleæ.

98. Byssocaulon niveum, *Mont. in Ann. Sc. Nat.*, Sér. II. iii. (1835) 355; *B. filamentosum*, Nyl., Lich. Nov. Zel., p. 77.—*Colenso*, 1613.

Trib. Cœnogonieæ.

*99. Cœnogonium tomentosum, *Muell. Arg.*; thallus obscure flavescenti-glaucus, dense cæspitoso-tomentosus, filamenta erecta, brevia, parum v. non intertexta, circ. 13 μ lata, inter articulos non constricta, hyphis distinctis validiusculis obducta; articuli subduplo longiores quam lati; apothecia novella alba, magis evoluta $\frac{1}{4}$–1 mm. lata, carneo-aurantiaca, margine albido cincta, leviter concavo plana; sporæ 8-næ, uniseriatim 8-næ, 10–11 μ longæ $2\frac{1}{2}$ μ latæ, fusiformes.—Inter *C. pannosum*, Muell. Arg. et *C. diffractum*, Krempelh. habitu et crassitie filamentorum medium tenet.—Corticola, *Colenso*, 1615.

*100. Cœnogonium subtorulosum, *Muell. Arg.*; thallus albido-glaucus, cæspitulos exiguos orbiculares nano-hemisphæricos et demum confluentes formans; filamenta brevia, intricata, 20–25 μ lata, inter articulos modice lyrato-constricta, in superficie creberrime hyphemoïdeo-papillosa; articuli fere duplo longiores quam lati, ellipsoidei; apothecia ignota.—Juxta *C. heterotrichum*, Muell. Arg. inserendum est.—Corticola, *Colenso*, 1656.

Trib. Thelotremeæ.

101. Ocellularia cavata, *Muell. Arg. in Flora*, lxv. (1882) p. 499.—*Colenso*, 1544.

102. Thelotrema lepadinum, *Ach.*, *Lichenog. Univ.*, p. 312.—*Colenso*, 1601, 1774.

Trib. Graphideæ.

103. Opegrapha subfarinosa, *Muell. Arg. in Bull. Herb. Boiss.*, ii. App. i. (1894) p. 78.—*Colenso*, 1572, 1573.

104. Graphis assimilis, *Nyl.*, *Prodr. Gall. et Alger.*, p. 150.—*Colenso*, 1603.

*105. Graphis emersa, *Muell. Arg. in Hedwigia*, xxxii. (1893) p. 133.—*Colenso*, 1628.

106. Graphis comparilis, *Nyl.*, *Syn. Lich. Nov. Caledon.*, p. 89.—*Colenso*, 1524.

107. Arthonia complanata, *Fée*, *Ess.*, p. 54.—*Colenso*, 1775.

108. Nesolechia oxyspora, *Massal.*, *Misc.*, p. 13; *Lecidea oxyspora*, Nyl., Scand., p. 246.—In thallo *Stictæ* cujusdam valde mutilatæ.—*Colenso*, 1528. Antea (*in Bull. Herb. Boiss.*, ii. App. i. (1894) p. 61) hanc speciem inter *Lecideas* recepi, quibuscum thalamii structura

convenit, sed apothecia omnino immarginata hinc inde e formâ regulari in arthonioideo-irregularem abeunt et affinitatem arctiorem cum tribu *Graphidearum* indicant. Locum nunc habeat juxta *Celidium*.

Ordo IV. PYRENOCARPEÆ.

Trib. PYRENULEÆ.

*109. PORINA (sect. SAGEDIA) LEUCOTHALLINA, *Muell. Arg.*; thallus albus, tenuissimus, continuus et lævis, demum farinulentus (gonidiis chroolepoideis); apothecia $\frac{1}{4}$ mm. lata, leviter depresso-globosa, fere parte dimidia emersa, rotundato-obtusa, nigra, opaca; perithecium integrum, basi tenue; paraphyses firme capillares; asci angusti, 1-seriatim 6–8-spori; sporæ 12–15 μ longæ, $2\frac{1}{2}$–3 μ latæ, obtuse fusiformes, 2-loculares v. rarissime et 4-loculares.—Juxta cubensem *P. mundulam*, Muell. Arg., locanda est. Subsimilis neozelandica *P. albinula*, Muell. Arg., differt thallo minus albo, apotheciis minoribus et perithecio dimidiato.—Corticola, *Colenso*, 1506.

On a new genus of Siphonean Algæ—*Pseudocodium*. By Mrs. Weber van Bosse. (Communicated by George Murray, F.L.S.)

(Plate I.)

[Read 6th June, 1895.]

On the rocks near Isipinga, and at the foot of the well-known bluff near Durban, I collected in the month of November, 1894, an alga, which proved to be new to science, and to belong to a new genus of the family of Codiaceæ, Wille. Unfortunately I found it only in a sterile state, but its anatomical characters are very marked, and distinguish it well from all the other members of this family. It may be described as follows:—

Pseudocodium, gen. nov.

Frondes virides dichotomi, rami cylindrici omnino consimiles ex filis tubulosis subparallelis, longitudinaliter dispositi, apice iterum atque iterum divisi contesti, articuli exterioses apice in vesiculos oblongos evoluti corticem pseudoparenchymaticam formantes, rhizini filiformes cum granulis sabulosis et inter se dense intertextis. Progatio ignota.

Species unica. P. De-Vriesei.

Hab. Rupicola, ad littora Nataliæ, Africæ australis.

It resembles in its outward appearance a *Codium* (Plate I. fig. 1), above all when taken freshly out of the water. Size, colour, habit, recall that genus; but on looking more attentively the observer will be struck by the fact that the vesicles or clavate ramuli, as Harvey called the peripheral branches of *Codium*, adhere closely together and so firmly that it is impossible to detach them from each other without injuring the plant (fig. 2). The peripheral ramuli of *Codium*, on the contrary, are, as everybody knows, entirely free from the base to the top. The likeness to *Codium*, however, is so great, that I still thought my alga might belong to this genus, and might perhaps constitute an extreme member of it. Sections made through the frond convinced me of my erroneous opinion and indicated clearly that *Pseudocodium* is, in fact, much nearer related to *Halimeda* than to *Codium*, notwithstanding that the calcareous incrustation and the wedge-shaped joints, both distinguishing the Halimedæ from all the other Codiaceæ, are wanting.

A section through the top of one of the branches of *Pseudocodium* shows clearly that the growth of this plant is distinctly apical (Plate I. fig. 3). The same occurs in *Halimeda.* At the top the tubes are much thinner than lower down; they are densely filled with protoplasm, and give off many branches; each tube bearing its branches mostly on one side. These branches (fig. 4) may divide again or swell up at the apices, transforming themselves at once into vesicles, which on their first appearance are roundish and quite free, but soon grow oblong and acquire a generally hexagonal form in transverse section by mutual pressure. When they have assumed this form they adhere so closely together that a section or a piece of the frond must be exposed during a considerable time to the influence of caustic potash, or eventually be boiled in this solution, which dissolves the cork layer covering the surface of the vesicles, before they are detached from each other. Each vesicle is borne on a single shorter or longer stalk by which it is connected with the tube from which it sprang. These stalks may be very narrow at the base of the vesicles but a stopper of cellulose, so often seen in the tubes of the Codieæ, was not observed (fig. 2).

Besides the branches at the top, all due to apical growth, the primitive tubes may later on and lower down give off secondary tubes or branches, though more rarely. These secondary tubes or later branches grow in all directions between the other tubes. All the tubes are densely filled with grains of amylum, becoming intensely blue on applying chloriodide of zinc. I was unable to study the chromatophores in living material while staying in Natal.

In *Codium* the mode of growth is quite different from that of *Pseudocodium.* First of all the tubes that constitute the interior of the plant, are much thinner. Sections made through an apex of *Codium tomentosum,* indicate that every tube in this region swells at the top and transforms itself into one of the well-known clavate ramuli of the genus *Codium.* After this ramulus or vesicle has attained a certain size, a little protuberance appears at its base, and this grows out into a lateral tube (figs. 5, 6, 7, 8, 9). The number of lateral tubes given off in this way may be one or more These new tubes increase in size, they may divide themselves or not, but they invariably end by inflating their top into another vesicle. This explains why the vesicles of *Codium* are always connected with two and often with more tubes at their base. In fact, with the formation of every vesicle ends the growth of a tube; at the base of the vesicle springs forth a new tube, which repeats the process, that calls to mind the mode of growth of the so-called scorpioid-cyme inflorescence of phanerogamous plants.

The hairs of *Codium tomentosum* appear later as excrescences at the top of the vesicles.

As I have already stated, I was not successful in finding the organs of fructification of *Pseudocodium* during the short time at my disposal. I suppose that they must appear in a manner somewhat like those of *Halimeda* and at the outside of the plant, for the vesicles form a pseudo-parenchymatous layer of cells, through which no spores could escape. It will be useless, therefore, to look for sporangia at the base of the vesicles, where they are found in *Codium*. I hope that the zealous investigators of algæ in South Africa will soon be able to fill up this blank in the life-history of *Pseudocodium*.

On examining preserved and much shrunk material in alcohol, I observed a few constrictions on the fronds. I had not remarked these before on the living plants, but I cannot tell whether they escaped my notice or became only visible after exposure of *Pseudocodium* to the influence of alcohol. These constrictions are places where the growth from one reason or another springs forth with new vigour and reminded me of what happens at the base of every joint of *Halimeda*.

Pseudocodium has a green filamentous alga living among its tubes, beneath the pseudo-parenchymatous layer of vesicles. This green alga twines between the tubes and adheres pretty firmly to them. Here, again, I could find no spores and must content myself with calling the attention of others to this curious little plant.

I propose the name of *Pseudocodium* for our alga, on account of its superficial resemblance to *Codium*. I have the honour to join to it, as specific name, the well-known name of Prof. Hugo de Vries, of Amsterdam, in grateful remembrance of the hours spent under his tuition.

EXPLANATION OF PLATE I.

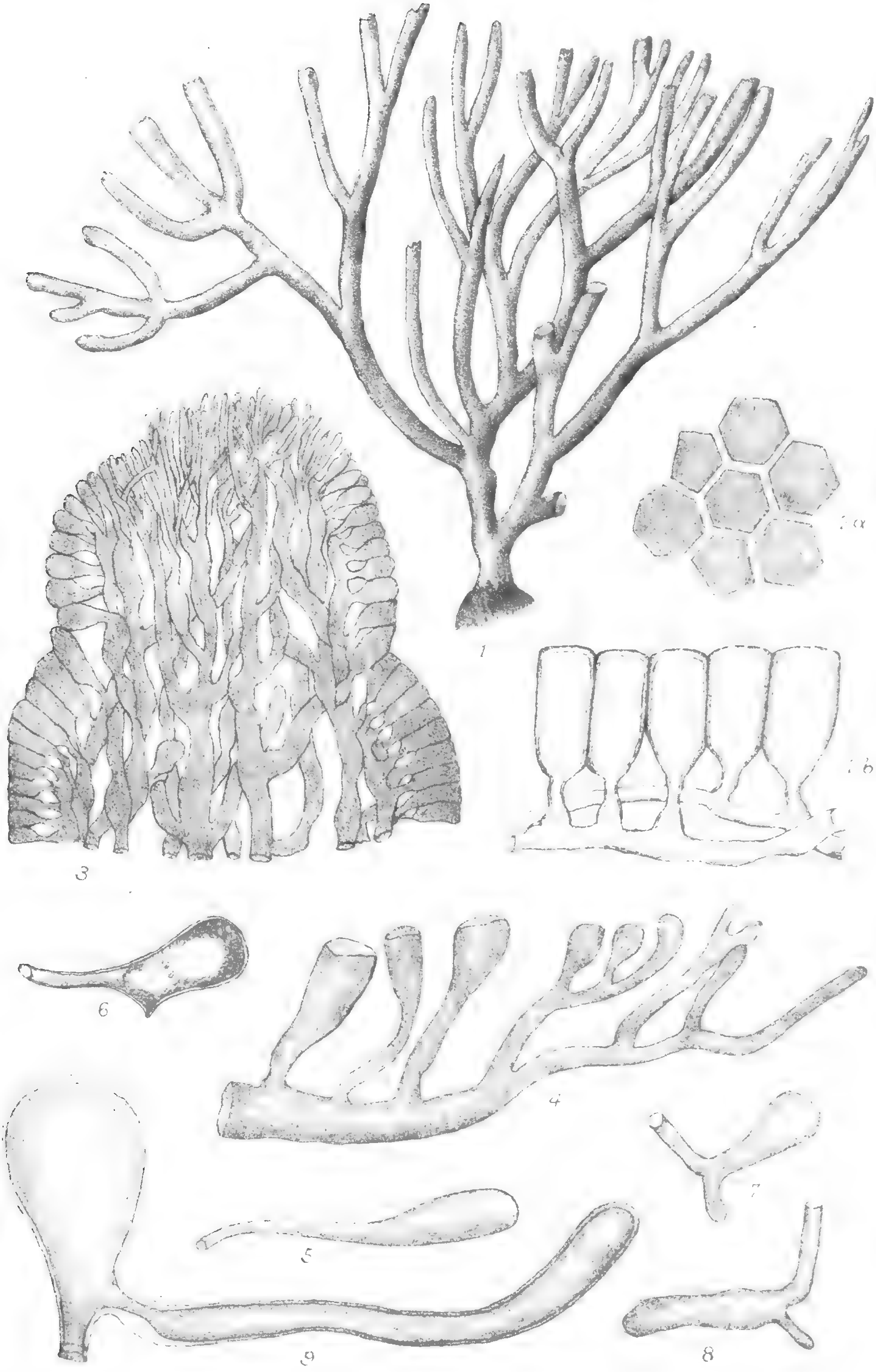
Fig. 1. *Pseudocodium De-Vriesei*, nat. size.

2. Peripheral vesicles of *Pseudocodium*, (*a*) seen from above, (*b*) seen from the side. Obj. C, oc. 2, of Zeiss.

3. Section through the top of a branch. Obj. A, oc. 2.

4. A single tube more enlarged, showing the apical growth. Obj. C, oc. 2.

5, 6, 7, 8, and 9. Different stages of development of the vesicles of *Codium*: 5, end of a tube swelling out in a vesicle; 6, first appearance of a small protuberance; 7, 8, 9, various stages of the new lateral tube. Obj. C, oc. 2, slightly reduced.


1
1a
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A.R.Hammond lith. Hanhart imp.

PSEUDOCODIUM DE-VRIESEI, Van Bosse.

The *Orchideæ* and *Apostasiaceæ* of the Malay Peninsula. By HENRY RIDLEY, M.A., F.L.S., Director Gardens and Forest Department, Singapore.

[Read 5th April and 3rd May, 1894.]

THE plants enumerated and described in this paper are those of the Malay Peninsula, from Kedah State (lat. 7° N., long. 99°·30 to 104°·30 E.) to Singapore, including the Lankawi Islands, and all other islands adjacent to the west coast, and the islands of Pulau Tioman, Pulau Tinggi, and Pulau Aor, on the east coast of Johore. I have added a few from Southern Siam, on the borders of the Malay Peninsula.

The whole area is about 50,000 square miles in extent. Much of this country is as yet practically unknown botanically; the northern States and the hill ranges which form the main chain of the peninsula, when it is possible to explore these, will doubtless add very largely to our knowledge. Of the earlier collectors, Cuming and Lobb found many species in Singapore, and both visited Mount Ophir in Malacca. Unfortunately Lobb's collections were so irregularly labelled that it is often doubtful as to where he obtained his specimens. In Wallich's Herbarium are a number of species collected by himself in Singapore and Penang, and by Finlayson in Penang and other parts of the peninsula. Griffith collected many on Mount Ophir and other parts of Malacca, and Maingay collected also in Penang and Malacca. Perak, a very rich district, has been explored by Father Scortechini, Mr. Wray, of the Perak Museum, Kunstler, Mr. Curtis, and myself. Mr. Curtis has obtained many species also in Penang, Kedah, the Lankawi Islands, and on the Siamese coast. I have visited myself, within the last six years, the States of Johore, Malacca, Pahang, Selangor, Sungei Ujong, Perak, Kedah, and the Island of Penang; as well as investigated pretty thoroughly the Island of Singapore; and I have received from many other parts of the peninsula, living and herbarium specimens from native dealers, and from various private persons; among the latter Lieut. Kelsall, R.A., obtained valuable series from the high hill, Bukit Hitam, and from the limestone caves of Kwala Lumpur in Selangor, and also from various parts of the interior of Johore, during an expedition across the peninsula in company with Mr. Lake; and Dr. Keith while residing at Bangtaphan in Siam sent a number of herbarium specimens, with sketches and notes, as well as living plants.

In the following list, I have marked with "v.s." those that I have only examined in a dry state, and due allowance must be made for *post-mortem* changes in these. A large proportion of the species described are or have been under cultivation in the Botanic Gardens in Singapore. I have added here and there a few descriptions of species from outside the Malay Peninsula, chiefly plants closely allied to the peninsular species. These descriptions are enclosed in brackets. All the localities marked with a ! and no collector's name, were obtained by myself; and those which have no ! are species which I have not seen in the peninsula.

Habitats.—The greater part of the Malay Peninsula is covered with dense jungle which extends to the tops of nearly all the hills, though the trees at about 4,000 feet elevation are more stunted. In the low country forest epiphytic orchids are comparatively rare, and when they occur are usually situated on the upper branches of the loftiest trees, so as to be nearly inaccessible. Terrestrial orchids, chiefly *Neottieæ*, some of which are saprophytic, occur scattered all through the forests, usually sparingly, and owing to their dull or brown colouring are often very inconspicuous. The mangrove swamps and tidal river banks are often very rich in epiphytic species, which sometimes thickly cover the branches of the trees. In the drier and more sunny spots along the sea coast, and the more open rivers, species of *Thrixspermum*, *Renanthera*, and *Aerides* scramble over the rocks in thick masses. The open country where the forests have disappeared produces but few species; *Spathoglottis plicata*, Blume, *Eulophia*, *Geodorum*, *Bromheadia palustris*, Lindl., *Habenaria lacertifera*, Benth., occur in dry grassy spots. *Liparis paradoxa*, Reichb. f., *Thrixspermum lilacinum*, Reichb. f., and *Vanda Hookeriana*, Reichb. f., grow in the grassy swamps. A few common species are abundant in the orchards and gardens of the villages; such are *Dendrobium crumenatum*, Sw., *D. pumilum*, Roxb., *D. Leonis*, Reichb. f., *D. micranthum*, Lindl., *Cirrhopetalum vaginatum*, Lindl., *Bulbophyllum clandestium*, Lindl., *Dendrocolla Trichoglottis*, and *D. filiformis*, and *Acriopsis javanica*, Reinw.

In many of the hill forests, orchids become more abundant, as one ascends; the jungle becomes more open, and on the exposed rocky slopes, called *Padang Batu* (stone fields) by the natives, a great variety can often be found. And in these places it is noticeable that species which in the low country are only to be found on the tops of the loftiest trees, are here to be seen growing on the ground or quite low down on the stems and branches of the bushes and small trees. Thus, on Kedah Peak, at about 3,000 feet elevation, the ground in some places is thickly carpeted with plants of *Bulbophyllum*, *Cœlogyne*, *Dendrobium*, *Platyclinis*, *Eria*, &c., in such a manner that one is up to one's waist in them.

A very different orchid flora is that of the limestone hills, which are scattered about all over the peninsula, but which chiefly run in a broken line north and south. These hills are usually mere isolated masses of crystalline limestone, of no great size or altitude, often many miles apart, but apparently forming lines parallel to the main chain of granite mountains which forms the backbone of the peninsula. Orchids are here very plentiful, growing both on the weathered pinnacles of rock, and on the small trees and shrubs growing in the crevices. The rocks of the Lankawi Islands, which have produced so many peculiar plants of all orders, are also of limestone.

Flowering of Orchids.—The rainfall being very heavy, and spread over the whole year, there is no distinction of wet and dry seasons; this is probably the reason why there is no special flowering season for most orchids. The greater part of the species flower at longer or shorter intervals throughout the year, though perhaps more may be found in bloom in the first three months. *Calanthe curculigoides*, Lindl., and *Grammatophyllum speciosum*, Blume, are exceptions; the former flowering regularly in November, the latter in August or September. Saprophytic plants appear generally when hot and dry weather follows heavy rains; and this applies not only to orchids such as *Lecanorchis* and *Didymoplexis*, but also to the *Burmanniaceæ* (*Thismia*, *Burmannia tuberosa*, Becc., and *Gymnosiphon*) and saprophytes of other orders; so that when one or other of these is found, the others may be expected to be in flower as well; but merely clearing a track through the jungle will often cause these plants to appear in a few weeks, whatever be the weather. A certain number of species flower irregularly all through the year, and are indeed rarely out of flower. Others, of which *Dendro-*

bium crumenatum, Sw., is the best known, invariably produce their flowers simultaneously on certain days. The special day holds good throughout the district; almost every plant bursts into blossom, and may remain in flower for but a few hours, sometimes a whole day; after which the flowers wither and no more appear till the next flowering day. Even plants brought from as far north as Siam to Singapore conform immediately to the Singapore day, and do not flower on that of their native place. Observation seems to show no correlation with the weather; though if there is very heavy rain on the day that the flowers are ready to open, they usually delay till it is over. Besides *Dendrobium crumenatum*, Sw., *D. teres*, Lindl., *D. Kunstleri*, Hook. f., *D. criniferum*, Lindl., and other species of the *Desmotrichum* section of *Dendrobium*, *Bulbophyllum concinnum*, Hook. f., *B. macranthum*, Lindl., *Eria floribunda*, Lindl., *E. densa*, mihi, &c., behave in the same way. The advantages for purposes of fertilization, especially in the case of plants producing flowers singly, is obvious; for were these to flower one at a time, as their blossoms are but short-lived, they would run a great risk of not being fertilized at all. But what causes the plants to break out into bloom on a definite day is not at all clear.

There is a considerable variation in the method of opening of the flowers.

In some, all the flowers in the raceme open simultaneously, as in *Cirrhopetalum*. Others produce a raceme which, growing and elongating slowly, bears each day three or four fully open flowers only; these, unless fertilized, fall the next day, before or as soon as the next three or four open. A raceme of *Grammatophyllum*, developing in this manner, will last for a month and a half. The intervals of time between the opening of the two adjacent flowers may be thus from one to several days; but they are longest in the *Fornicariæ*, *Thrixsperma*, and *Bulbophylla* of the section *Intervallatæ*. Here the rhachis grows very slowly, and the flowers open one by one, with intervals of from about 10 days (*Dendrocolla filiformis*, Ridl.) to more than a month (*Bulbophyllum Stella*, Ridl.); so that a raceme may take nearly a year before it has come to the last flower.

Distribution.—The orchid-flora of the whole region is tolerably homogeneous, and may be generally spoken of as strictly Malayan; a considerable proportion being common to

Sumatra, Borneo, and Java. In the north, however, above Kedah Peak, a number of Tenasserim species, such as *Spathoglottis Handingiana*, Par. et Reichb. f., *Dendrobia* of the *Speciosæ* section, *Stauropsis giganteus*, Benth., *Vanda teres*, Lindl., appear; and many of the typical Malayan genera, such as *Claderia*, *Dipodium*, *Appendicula* and *Podochilus* become scarce or disappear. When this portion of the country is explored, I believe we shall find a tolerably clear line of demarcation between the two floras, somewhere between the latitude of the Lankawi Islands and Kedah Peak. The flora of this latter mountain has a remarkable similarity to that of Mount Ophir, far away to the south, and is very different from that of the intermediate Perak hills.

Throughout the peninsula there is an Australian element in the flora, chiefly to be observed in the open country, by the seashore, or on the tops of the higher hills. This is illustrated by the representation of such genera as *Casuarina*, *Lepidosperma*, *Bæckea*, *Leptospermum*, *Melaleuca*, and *Gahnia*. But the only typical Australian genera of orchids are *Cryptostylis* and *Corysanthes;* the former of which is found as far north and west as the Himalayas and Ceylon.

There is no trace here of the African element as illustrated by the genera *Mystacidium*, *Satyrium*, and *Disperis* in the Indian flora.

Of the 87 genera as yet known from this region, 9 are common to both hemispheres, viz., *Microstylis*, *Liparis*, *Bulbophyllum*, *Calanthe*, *Polystachya*, *Vanilla*, *Pogonia*, *Habenaria*, and *Cypripedium*. Four others occur through India as far west as Africa, viz., *Eulophia*, *Acampe*, *Corymbis*, and *Zeuxine*. Fifteen are confined to the Malay Peninsula and archipelago, and are absent from the Indian region, viz., *Claderia*, *Platyclinis*, *Dendrochilum*, *Chrysoglossum*, *Grammatophyllum*, *Bromheadia*, *Plocoglottis*, *Microsaccus*, *Adenoncos*, *Vrydagzynea*, *Cystorchis*, *Dossinia*, *Hylophila*, *Dilochia*, *Oxyanthera;* while *Hæmaria* is also found in China, *Lecanorchis* in Japan, and *Corysanthes* and *Cryptostylis* in Australia. The remainder occur also in India, with the exception of *Leucolena*, *Renantherella*, and *Ascochilus*, which have as yet been only met with in the Malay Peninsula.

Native Names.—The Malays call all the epiphytic species generically "*Angrek*," or "*Sakat*." The latter name, however, is applied also to a number of other epiphytic plants, such as

Rhaphidophora and *Epipremnum.* They seldom confuse other epiphytic plants with orchids; and distinguish them from epiphytic ferns, &c., with considerable accuracy. The terrestrial orchids with large plicate leaves, such as *Calanthe* and *Spathoglottis,* are usually called "*Lumbah,*" or the reduplicative "*Lulumbah*" for "*Lumbah-Lumbah.*" Properly speaking, this name belongs to *Curculigo sumatrana,* Roxb., and the similarity of the leaves is the cause of the transference of the name.

OBERONIA, Lindl.

Sect. 1. *Acaules.*

O. DISSITIFLORA, *Ridl., sp. nova.* Acaulis. *Radices* copiosæ. *Folia,* 4–5, 3 poll. longa, $\frac{1}{2}$ poll. lata (vel minora), ensiformia, falcata, subacuta, carnosula. *Spica* 5 poll. longa, gracilis, ferme omnino florifera; rhachis basi anceps, superne teres. *Flores* copiosi, minimi, dissiti nec fasciculati, flavi. *Bracteæ* ovatæ, obtusæ, ciliatæ, virides apice albæ. *Ovarium* breviusculum, glabrum. *Sepala* late ovata, obtusa, integra, glabra. *Petala* lanceolata, angustiora, integra, glabra. *Labellum* sepalis paullo longius, ovatum, quadratum, obtusum, apice ciliatum; fovea conspicua, smaragdina. *Anthera* ovata, citrina; pollinia majuscula, rufescentia.

Hab. Singapore: Kranji, rare!

This distinct little species, with very short-pedicelled flowers, belongs to the group with rather broad petals and an entire lip.

O. STENOPHYLLA, *Ridl., sp. nova.* Acaulis, cæspitosa. *Radices* copiosæ. *Folia* $2\frac{1}{2}$ poll. longa, $\frac{1}{8}$–$\frac{1}{4}$ poll. lata, ensiformia, falcata, acuta vel subacuta. *Spica* $3\frac{1}{2}$ poll. longa, gracilis, curva, ferme omnino florifera; rhachis teres, canaliculata. *Flores* copiosi, minuti, fasciculati; fasciculi dissiti. *Bracteæ* cum pedicellis æquilongæ, lanceolatæ, acuminatæ. *Sepala et petala* subæqualia, ovato-oblonga, obtusa. *Labelli* lobi laterales late oblongi laciniati, medius obtriangularis emarginatus, angulis acutis.

Hab. Johore: Hulu Sembrong, *Lake and Kelsall!* v.s.

This species belongs to the group with broad petals, and a three-lobed lip (the median lobe nearly bifid). It is allied to *O. insectifera,* Hook. f. The flowers appear to have been yellow.

[OBERONIA TREUBII, *Ridl.*, *sp. nova.* Acaulis, pusilla. *Folia* $1\frac{1}{2}$ poll. longa, $\frac{1}{8}$ poll. lata, ensiformia, acuta, carnosa, sæpe rufescentia. *Spica* 2–3-poll. longa, ferme omnino florifera. *Flores* minuti, subverticillati. *Bracteæ* cum pedicellis æquilongæ, lanceolatæ, acuminatæ. *Sepala* et *petala* subsimilia, subæqualia, ovato-lanceolata, obtusa, pallide rufescentia; sepala lateralia deflexa. *Labellum* 3-lobum, læte rubrum; lobi laterales rotundati, medius longior rotundatus obtusus. *Columna* parva, flava. *Capsula* $\frac{1}{16}$ poll. longa, oblonga.

Hab. Java; on trees in Buitenzorg Gardens.

Dr. Treub first sent me this pretty little species; subsequently I saw it in the Buitenzorg Gardens.]

O. SCORTECHINI, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 683.
Hab. Perak: *Scortechini.*

O. INSECTIFERA, *Hook. f.*, *Ic. Pl.*, t. 2004.
Hab. Perak: Larut, *King's Collector.*
Pahang: Tahan River.

O. LUNATA, *Lindl.*, *Gen. et Sp. Orch.*, p. 17.
Hab. Singapore: Selitar! On a high tree, *Ridley* (n. 364).

A very pretty tufted species with innumerable flowers, so closely arranged that the red lips alone are visible.

O. ROSEA, *Hook. f.*, *Ic. Pl.*, t. 2005.
Hab. Perak: Gunong Batu Putih, *Wray.* Larut Hills, *King's Collector.*

Sect. 2. *Caulescentes.*

O. ANCEPS, *Lindl.*, *Sert. Orch.*, sub t. 8 B.
Hab. Singapore: Kranji!
Malacca: Tanjong Kling! (by the sea, on *Calophyllum* and *Terminalia Catappa*); Pengkalan Minyak!
Penang: Waterfall Hill!
Pahang: Passir Loyang! Pahang River mouth!
Perak: Dindings!

The commonest species in the peninsula: abundant on trees in many parts of the low country. Flowers ochre-yellow. In Malacca it is known as "Sakat Lidah Buaya"—"Crocodile's tongue Orchid," and the leaves are made into poultices for boils.

OBERONIA MINIATA, *Lindl., Bot. Reg.* (1843) *Misc.*, p. 6.
Hab. Singapore: *Hort. Loddiges.*

I have not met with this. As it is stated to occur in the Philippine Islands (Hook. f., Fl. Brit. Ind., v. p. 685), it was probably wrongly localised in Loddiges' Gardens.

O. GRACILIS, *Hook. f., Fl. Brit. Ind.*, v. p. 685.
Hab. Perak: Kinta River, *King's Collector.*

O. PORPHYROCHILA, *Ridl.*, *sp. nova.* Subacaulis. *Radices* longæ, tenues. *Folia* usque ad 6 poll. longa, ½ poll. lata, lorata, acuminata, falcata, flaccida. *Spica* 4 poll. longa, tenuis, ferme omnino florifera; rhachis angulata, glabra. *Flores* minimi, in spicæ basi approximati in apice fasciculati, flavescentes. *Bracteæ* lineares, acutæ, integræ. *Sepala* brevia, ovata, obtusa. *Petala* linearia, sepalis multo angustiora, flavescentia. *Labellum* 3-lobum, ovatum, purpureum, auriculis longis recurvis; lobus medius lobis brevibus divaricatis bifidus, margine undique denticulatus.
Hab. Selangor: Bukit Hitam, *Lieut. Kelsall!*

O. CILIOLATA, *Hook. f., Fl. Brit. Ind.*, vi. p. 181.
Hab. Singapore: not rare in the mangrove swamps, Kranji! Sungei Morai! Chan Chu Kang! Changi! *Ridley* (n. 2034 a).
Malacca: Sungei Kesang!

Flowers whitish-yellow.

O. BRUNESCENS, *Ridl.*, *sp. nova.* *Caulis* 1 poll. longus. *Folia* ¾ poll. longa, ⅛ poll. lata, cultrata, falcata, acuta. *Spica* 4 poll. longa, gracillima, teres, basi longe nuda. *Flores* remoti, minimi, rufo-brunei; pedicelli graciles. *Bracteæ* ovatæ, acutæ. *Sepala* ovato-oblonga, integra. *Petala* lata, ovata, laciniata. *Labellum* ovatum, laciniatum, non lobatum. *Capsula* ⅛ poll. longa, ellipsoideo-pyriformis.
Hab. Perak: Larut Hills!

MICROSTYLIS, Nutt.

M. CALOPHYLLA, *Reichb. f. in Gard. Chron.* (1879), II. p. 718. *M. Scottii*, Hook. f., Fl. Brit. Ind., v. p. 678, et Bot. Mag., t. 7268. *Liparis elegantissima*, Hort.

M. Scottii, Hook. f., was described from a drawing of a plant

found at Rangoon by Mr. Scott. Later a plant obtained from a native dealer by the Singapore Gardens was sent to Kew; where it flowered, and was figured in the 'Bot. Mag.' In 1893, a number of plants were brought down from the Tonka district (in Siam) to the Penang Gardens. Reichenbach's *M. calophylla* was described without locality. I received some years ago a specimen from Mr. Moore, of Glasnevin Gardens, which he informed me was from the plant sent to Reichenbach; and I have seen specimens of this plant collected in Borneo by Dr. Haviland. *M. calophylla*, Reichb. f., and *M. Scottii*, Hook. f., are I think identical.

MICROSTYLIS ACUTANGULA, *Hook. f.*, *Ic. Pl.*, t. 1835, *et Fl. Brit. Ind.*, v. p. 688.

Hab. Perak: Batang Padang, *Wray!* Larut Hills! (rocks at 4,000 feet alt.).
Selangor: Bukit Hitam, *Lieut. Kelsall.*

Flowers light green.

M. MICRANTHA, *Hook. f.*, *Ic. Pl.*, t. 1834, *et Fl. Brit. Ind.*, v. p. 688. Terrestris, longe repens. *Caules* 6 poll. longi, teretes, succulenti, ebulbosi. *Folia* subdisticha, petiolata, tenuia, lanceolata, acuta, crispa, patula, dissita, pulcherrime cuprea subtus virescentia; petiolus ½ poll. longus, purpureus; lamina 2–4 poll. longa, ¾ poll. lata. *Racemus* 4–6 poll. longus, erectus, gracilis, teres, purpureus, basi longe (usque ad ⅔ partem) nudus. *Flores* parvi, copiosi, dissiti. *Bracteæ* lineares, acuminatæ, recurvæ. *Sepala* lorata, obtusa, recurva, purpurascentia. *Petala* sepalis subsimilia, paullo minora. *Labellum* ovate, læte flavum, auriculis magnis loratis obtusis; laminæ dentes 5, viz. 4 breves acuti, 1 medius major obtusus; fovea distincta, viridi-rotundata. *Columna* brevis, viridis; stelidia magna, porrecta, rotundata: anthera flava. *Capsula* ½ poll. longa, brevissime pedicellata, oblonga.

Hab. Singapore: Bukit Mandai! Selitar! Changi! Chan Chu Kang!
Malacca: *R. Derry!*
Perak: Larut Hills, alt. 5,000 feet!
Johore: Gunong Pulai!

This foliage species (resembling *Avanturina*) belongs to the small group of creeping *Microstylides;* its nearest ally being *M. commelinifolia*, Zoll. et Mor., of Java and Borneo. It inhabits damp woods, where it grows on and through the damp woods like an *Anœctochilus*. It is very impatient of cultivation.

MICROSTYLIS PERAKENSIS, *Ridl.*, *sp. nova.* *M. plantaginea*, Hook. f., Fl. Brit. Ind., v. p. 688 (NON Steud., Nomencl., ed. II. ii. p. 144). *Caulis* repens, $\frac{3}{8}$ poll. crassus. *Folia* plura, dissita, admodum inæqualia, ovata aut ovato-lanceolata, acuta, plicata, costata, admodum inæquilatera, tenuia, viridia; petiolus 1–2 poll. longus, crassus, canaliculatus; lamina 6 poll. longa, 2 poll. lata. *Scapus* pedalis, erectus, validus, quadrangularis, basi (bracteis paucis exceptis) nudus. *Flores* plurimi, dissiti, pro genere spectabiles. *Bracteæ* $\frac{1}{4}$ poll. longæ, deflexæ, lanceolatæ acuminatæ acutæ. *Pedicelli* $\frac{1}{2}$ poll. longi, patentes. *Sepalum* posticum oblongum obtusum, lateralia $\frac{1}{8}$ poll. longa ovato-oblonga postico latiora labello breviora. *Labellum* maximum; auriculæ $\frac{3}{8}$ poll. longæ, lanceolatæ acutæ, sepalum posticum superantes, violaceo-roseæ; lamina parva, rotundata, dentibus 6 longis incurvis roseis; fovea profunda, elliptica, marginibus multum elevatis. *Columna* alta, pro genere smaragdina; stelidia porrecta, oblonga, truncata; anthera depressa, flava.

Hab. Perak: Batu Kuran, *C. Curtis* (Fl. in Hort. Penang, Aug., 1893).

What is evidently this species was referred by Sir Joseph Hooker to *M. plantaginea*, Steud. (*Pterochilus plantagineus*, Hook. and Arn.), a native of the Society Islands, from which I believe this plant to be quite distinct. The foliage and stem are very similar in the two; but in *M. perakensis* the bracts are twice as long, the sepals shorter, the lip, instead of being nearly quadrate, is almost three-lobed. The auricles are very large, longer than the dorsal sepal; and, between them and the dentate mid-lobe, is a distinct notch. The mid-lobe is quite short, with six in-curved processes. In *M. plantaginea*, Steud., the lip is oblong, squared in outline, there being no distinction of the mid-lobe; the teeth are shorter, more equal, more numerous, and straight; and the fovea oval-rounded.

Crepidium Rheedii, Blume, also referred to *M. plantaginea*, Steud., is I believe a totally different plant, with much smaller flowers. I have received it from Java. Lindley's *M. Rheedii* consisted of a mixture of *Epidendrum resupinatum*, Forst. f. (*i.e.*, *M. plantagineus*, Steud.), *Malaxis Rheedii*, Willd. (syn. *Microstylis Rheedii*, Wight), a native of India; and *Crepidium*

Rheedii, Blume (which, however, he marks with a ?), the Javanese plant. In the monograph of *Microstylis* I adopted Lindley's name for the Polynesian plant as being the oldest name, and as being the only one of the three plants Lindley included of which he had seen anything. But it would perhaps have been better to suppress the name altogether, as Sir Joseph Hooker has done.

MICROSTYLIS PRASINA, *Ridl., sp. nova. Pseudo-bulbi* vetusti 3 poll. longi, $\frac{3}{4}$ poll. lati, basi incrassati, novi crassi undique foliati. *Folia* usque ad 7-9 poll. longa 3 poll. lata, tenuia; petiolus crassus, canaliculatus, marginatus; lamina lanceolata aut ovato-lanceolata acuta, in petiolum attenuata, 5-nervis, viridis vel purpureo - nervata, margine crispata. *Racemus* 6 poll. vel ultra longus, crassus, obscure angulatus, basi longe nudus superne sublaxe racemosus, viridis vel purpurascens. *Flores* plures, virides. *Bracteæ* $\frac{1}{4}$ poll. longæ, lanceolatæ, triangulares acuminatæ, deflexæ. *Pedicelli* $\frac{3}{4}$ poll. longi, graciles, patentes. *Sepala* $\frac{1}{4}$ poll. longa, $\frac{1}{8}$ poll. lata, oblonga, obtusa. *Petala* sepalis longiora, anguste linearia. *Labellum* $\frac{3}{8}$ poll. longum et latum, suborbiculare, apice late obtuse 3-lobatum; auriculæ magnæ, rotundatæ, falcatæ; fovea parva, profunda, margine haud elevata. *Columna* smaragdina; stelidia elongata, erecta, apice obtusa.

Hab. Siam: Tonka!

Allied to *M. Wallichii*, Lindl. Leaves very variable. Flowers light semi-transparent green, darker in the centre of the lip, where the texture round the fovea appears glandular.

M. MACROCHILA, *Rolfe, in Kew Bull.*, n. 97 (1895), p. 6.

Hab. Siam.

Brought (with *M. prasina*) from Siam, sent to England by Mr. Curtis. Not from Pulau Aor, as suggested by Rolfe.

M. CONGESTA, *Reichb. f. in Walp. Ann.*, vi. p. 206.

Hab. Singapore: Chan Chu Kang! Kranji! Teban! Sungei Pandan!
Malacca: Sungei Hudang! Bukit Batu Fija!
Penang: Pulau Batong, *C. Curtis!*
Perak: Maxwell's Hill, Larut Hills! Rhio; *Christ. Smith* (in Herb. Mus. Brit.).

This is common in open dry woods in many parts of the peninsula. It is a terrestrial plant. There are two forms; the commonest here being the one with purple flowers (the var. *fusca*=*Dienia fusca*, Lindl.), which grows in the damper woods; while the other, with green or greenish yellow flowers, grows in drier spots.

It is commonly self-fertilized, the pollinia falling out of the anther upon the stigina over the edge of the very small rostellum. It almost invariably fruits, hardly a flower failing to set, and, like *Spathoglottis plicata*, Blume, and *Spiranthes australis*, Lindl., both self-fertilized plants, it is very widely distributed, occurring in Northern India, Burmah, Siam, Andaman Islands, China, Java, and Northern Australia. The natives in Malacca call it "Siqundol Hutan."

LIPARIS, L. C. Rich.

L. VENOSA, *Ridl. in Journ. Linn. Soc. (Bot.)* xxiv. (1888) p. 350.
Hab. Singapore: Chan Chu Kang!
Johore: Drawing at Kew!
Perak: *Scortechini.*

A very beautiful plant, but by no means common.

L. FERRUGINEA, *Lindl. in Gard. Chron.* (1848) p. 55.
Hab. Malacca: *Griffith!* (in herb. Kew.)
Perak: *King's Collector.*

Perhaps not distinct from L. nervosa, Lindl.

L. NERVOSA, *Lindl., Gen. et Sp. Orch.*, p. 26. *L. odorata*, Lindl., l.c., p. 26. *L. paradoxa*, Reichb. f. in Walp. Ann., vi. p. 218.
Hab. Singapore: Changi! Ang Mokio! Reservoir!
Malacca: Chabau! (in rice fields.)

In the genera and species of Orchidaceous plants Lindley described, as three distinct plants, *Empusa paradoxa*, based on specimens collected by Wallich in Northern India; *L. odorata*, based on a figure by Rheede in the Hortus Malabaricus, and *L. nervosa*, based on figures by Reeves and Thunberg. The first two have long since been recognised as belonging to the same species, a very widely distributed one. But *L. nervosa* I thought better to keep separate (see my monograph of *Liparis* in 'Journ. Linn. Soc.' (Bot.), xxii. (1886) 262), on the ground that it was quite distinct in colour, being purple flowered instead of yellow, and a native of China and Japan, whereas *L. paradoxa* was only known from the Indian region, though I could see no structural difference between the two.

In March, 1889, however, while collecting in a marshy spot at Ang Mo Kio, in Singapore, I found three plants of a species of *Liparis*, one of which was in flower, and was evidently *L. paradoxa*, Reichb. f. It had greenish yellow flowers much the colour of those of *L. Loeselii*, A. Rich. The other two plants were in bud. The locality was a hot exposed wet grassy field, full of such grasses as *Leersia hexandra*, Sw., and *Isachne australis*, R. Br.; and *Thrixspermum lilacinum*, Reichb. f., was scrambling through the grasses. The water was about 2 feet deep, with the *Liparis* growing in it. I removed the two unopened plants to the Botanic Gardens, had them potted and put into a shady place; both flowered in a few days, and were exactly similar in colouring. The sepals were exposed to the light when in bud, and the centres of the lip were of a deep purple black; while that part of the sepals which was covered by the lip and the edges of the lip (which were turned downwards, and so not exposed to full light) were green. In fact the flowers exactly resembled figures of *L. nervosa* of China.

This change of colour was the more striking as one of the plants had its buds very well developed when moved to the garden, and did not show any signs of darkening till it had been put in the shade.

From this I think it is clear that the two species are really the same, and that the colouring of the *S. nervosa* form is due to something analogous to melanism in animals.

I have already referred to a similar variation in colour in *Microstylis congesta*, Reichb. f. The *Thrixspermum lilacinum*, Reichb. f., too, which I got out of the same marsh as the *Liparis*, had its flowers nearly white, but grown in shade they put on the fine lilac colouring from which the plant takes its name. Indeed this plant varies very much in depth of colour in cultivation according to the brilliancy of the sun before opening.

LIPARIS WRAYII, *Hook. f., Fl. Brit. Ind.*, vi. p. 181.
Hab. Perak: *Wray*.

L. TRANSTILLATA, *Ridl., sp. nova.* *Pseudo-bulbus* vetustus $1\frac{1}{2}$ poll. longus, $\frac{5}{8}$ poll. crassus, cylindricus. *Caulis* junior a

foliorum vaginis fere omnino tectus. *Folia* circa 4, 6 poll. longa, 2 poll. lata, ovata aut ovato-lanceolata, acuta, admodum obliqua, plicata, læte virentia, nervis 8 depressis; petioli 2 poll. longi, lati, profunde canaliculati; vaginæ 1 poll. longæ. *Racemus* 6 poll. longus; rhachis alata, basi nuda, superne crispo-angulata. *Flores* mediocres, reversi; pedicelli $\frac{3}{8}$ poll. longi, graciles, purpurei. *Sepala* lorata, patula, lateralia $\frac{1}{4}$ poll. longa convoluta purpurascentia. *Petala* sepalis angustiora, linearia, pallidiora. *Labellum* unguiculatum, latum; lamina $\frac{1}{4}$ poll. lata, late oblonga, truncata, deflexa, obscure crenulata, atro-purpurea; canaliculus medianus olivaceus; callus basalis viridis e costâ rectâ transversâ (in cuspidibus purpureâ) structus. *Columna* suberecta, apice cucullata recurva, albescenti-flava; stelidia parva, oblonga, truncata; clinandrii margo integer, rotundatus; anthera plana, flava.

Hab. Perak: Maxwell's Hill, alt. 3,000 feet!

Grew with *Microstylis acutangula*, Hook. f. Flowered in the Singapore Garden. Allied to *L. atropurpurea*, Lindl., of Ceylon; but differs, *inter alia*, in the form of the callus.

LIPARIS MAINGAYI, *Ridl.* *Microstylis Maingayi*, Hook. f., Ic. Pl., t. 1826, et Fl. Brit. Ind., v. p. 689.

Hab. Penang: Waterfall Hill, *C. Curtis!*
Malacca: Mt. Ophir!
Perak: Larut Hills!
Kedah: Kedah Peak!

Grows on vertical, constantly wet, rock-faces. The amount of laciniation of the lip is very irregular; in a Penang specimen the lip was distinctly 2-lobed.

L. PARVULA, *Ridl.* *Microstylis parvula*, Hook. f., Ic. Pl., t. 1827 B, et Fl. Brit. Ind., v. p. 690.

Hab. Perak: Larut Hills, Maxwell's Hill, on dry rocks!

This, and the preceding species, with *L. furcata* [*i.e.*, *Microstylis furcata*, Hook. f., Ic. Pl., t. 1827 A, et Fl. Brit. Ind., v. p. 690], are closely allied plants of quite peculiar habit, possessing a single large well developed leaf, borne on a short stem covered with three or four sheathing leaves, which is, after flowering, developed into a large, oval, thick, pale green pseudo-bulb. Sir Joseph Hooker, Ic. Pl., t. 1826, is in doubt whether to refer the first-named to *Microstylis* or *Liparis*, deciding eventually for the former. I am more inclined to

the affinities of all three being with *Liparis*, for the following reasons; the column (in *L. Maingayi* especially) is much longer than is usual in *Microstylis*, and as this appears to me to be the chief distinguishing mark between the two genera, it must be allowed to have great weight. With respect to the form of the column, it is (in specimens from Penang Hill examined alive) broadly dilated at the base, narrowed upwards, and arched over the lip. The stelidia are distinct, though not very large. In *L. parvula* the column is much shorter, but still stands up well over the base of the lip, and the stelidia are much larger. Turning to the lip, we find that there is no claw, as in many (but not all) *Liparides*. There is a distinct fovea at the base in both species, and in the fovea are distinct but small calli. The presence of the fovea, a rounded depression at the base of the lip, is usual in *Microstylis*, but it does occur, also, in some of the *Liparides*, e.g., *L. venosa*, Ridl., where there is also a callus behind it. Finally, the lip is not auricled, as it is in most of the *Crepidium* section of *Microstylis*. For these reasons, I think that these plants should be referred to the genus Liparis. The colour of the flowers of both these species is not "dark blue" (as given doubtless from tickets written by native collectors), but a deep claret colour. (The Malay has no word in his own language for blue, and does not seem clearly to distinguish it, but always calls dark-red blue.)

Liparis parvula, Ridl., so closely resembles young plants of *L. Maingayi*, Ridl., that it is quite impossible to distinguish it when out of flower. In specimens from Maxwell's Hill, Larut Hills, Perak, I find the lip thickened by a longitudinal bar down the centre with a transverse bar at the upper end, which forms the lower wall of the fovea; while at the lower end it bifurcates, one arm going into each of the tails at the end of the lip. The margins of the lip are much thinner; and on the tails are numerous unicellular processes, doubtless rudiments of laciniation.

LIPARIS (§ CORIIFOLIÆ) LACERATA, *Ridl. in Journ. Linn. Soc.* (*Bot.*), xxii. (1886) p. 284.

Hab. Perak: *Scortechini*, &c.

Kedah: Gunong Rayah, *C. Curtis!* Borneo.

On trees in dense jungle. Flowers white, with orange lip.

LIPARIS LATIFOLIA, *Lindl., Gen. et Sp. Orch.*, p. 30. *L. Scortechini*, Hook. f., Ic. Pl., t. 2009, et Fl. Brit. Ind., v. p. 703.

Hab. Perak: Gunong Hijan, and other parts of Larut Hills!
Selangor: Bukit Hitam, *Lieut. Kelsall!*—Java.

Rather a handsome species; sepals and petals pallid pinkish white; lips reddish apricot colour. On trees, at 4–5,000 feet alt.

L. ELEGANS, *Lindl., Gen. et Sp. Orch.*, p. 30, *in Wall. List*, n. 1943. *L. gracilis*, Hook. f., Ic. Pl., t. 2011.

Hab. Singapore: common; Selitar! Kranji, Sungei Buloh!
Johore: Near the town!
Malacca: Bukit Bruang! Mt. Ophir!
Perak: Near the Waterfall, Thaiping!
Pahang; Pekan!
Penang: Moniot's Road, Waterfall Hill, *Curtis!*
Kedah: Kedah Peak, alt. 3,000 feet!
Lankawi Islands: Kwala Malacca, *Curtis!*

This species, so long doubtful, proves to be the commonest species of the genus in the peninsula. It is almost always terrestrial, growing either directly on the ground or on old stumps in dry woods, more rarely on the lower branches or trunk of a tree. It is most abundant in the low country near the sea; but ascends to 3,000 or 4,000 feet altitude on Kedah Peak and Mount Ophir. It frequently produces a rather long, stiff, woody rhizome, with distant pseudo-bulbs; but I have seen forms with crowded pseudo-bulbs and short leaves, which look at first sight as if of a distinct species. The sepals and petals are pale yellowish, the lip orange. The fruit varies from $\frac{1}{4}$ to $\frac{1}{2}$ in. in length.

I cannot separate *L. gracilis*, Hook. f. *L. elegans*, Lindl., Sir Joseph Hooker puts under a section with a solitary leaf, and says that the pseudo-bulbs are hardly developed; but in all the plants which I have seen there are very conspicuous pseudo-bulbs, and two or more leaves to each, as Mr. Rolfe, too, describes it.

L. FLACCIDA, *Reichb. f. in Linnæa*, xli. (1877) p. 45.

Hab. Malacca: Machap, *R. Derry!*
Perak: *King's Collector.*

The Malacca specimens are fully as big as the Javanese. Those obtained by King's Collector in Perak were, according to Sir Joseph Hooker, much smaller and had no calli on the lip. The Malacca plants have, at the base of the lip, two small bosses, which might easily be overlooked in dry specimens. The flowers are coloured exactly as in *L. elegans*, Lindl., and a big clump, with numerous nodding racemes of the very small flowers, is really very elegant. It grows usually on very lofty trees.

LIPARIS LONGIPES, *Lindl., Gen. et Sp. Orch.*, p. 30; *et in Wall., Pl. As. Rar.*, i. p. 31, t. 35.

Hab. Penang: Sungkei River, *Curtis!* n. 507.
Perak: Batang Padang, *Wray!*

This common Indian species seems very scarce in the Malay Peninsula. I have only seen two or three specimens collected in Penang by Mr. Curtis, and those in the Kew Herbarium obtained by Mr. Wray.

L. COMOSA, *Ridl., sp. nova.* *Pseudo-bulbi* $\frac{3}{8}$ poll. longi, approximati, conici. *Folia* $4\frac{1}{2}$ poll. longa, $\frac{1}{4}$ poll. lata, anguste lanceolata acuta, basi longe attenuata. *Racemus* 6 poll. longus, erectus, basi longe nudus complanatus tenuiter alatus. *Flores* parvi; pedicelli $\frac{1}{4}$ poll. longi. *Bracteæ* $\frac{1}{4}$ poll. longæ, cum floribus subæquilongæ, lanceolatæ, setaceæ. *Sepalum* posticum lanceolatum loratum, lateralia multo latiora lanceolata. *Petala* linearia. *Labellum* oblongum, subquadratum, apice rotundatum; calli nulli. *Columna* basi incrassata, superne paullo arcuata; alæ breves, obscuræ. *Capsula* $\frac{1}{8}$ poll. longa, ellipsoidea, subglobosa.

Hab. Perak: Tea Gardens, Larut Hills, alt. 1,500 feet, *C. Curtis!*

Allied to *L. cæspitosa*, Lindl., *L. angustifolia*, Lindl., and *L. obscura*, Hook. f., but larger than these. The flowers appear to have been green.

L. (§ DISTICHÆ) DISTICHA, *Lindl. in Bot. Reg., sub* t. 882.

Hab. Singapore: Kranji! Chan Chu Kang! Sungei Morai! Bukit Mandai!
Johore: Kwala Kahang, *Lake and Kelsall!*
Pahang: Kota Glanggi, on limestone rocks!
Lankawi Islands: *C. Curtis!*

A tufted plant, growing on low trees in or close to mangrove swamps in Singapore, and on the rocks and bushes in the limestone districts of Kota Glanggi and Lankawi.

The flowers are of an apricot orange colour.

LIPARIS COMPRESSA, *Lindl., Gen. et Sp. Orch.*, p. 32.

Hab. Perak: On trees in thick jungle in the Larut Hills, up to 5,000 feet altitude!

PLATYCLINIS, Benth.

P. LONGIFOLIA, *Hemsl. in Gard. Chron.* (1881) II. p. 656. *Dendrochilum longifolium*, Reichb. f. in Bonplandia, iv. (1856) p. 329.

Singapore: Kranji! Sungei Jurong! Sungei Morai!

Johore: Tanah Runto! Batu Pahat!

Abundant in some places, growing on old stumps or on the ground in dry woods. This flowers all the year round. It has dull yellowish flowers with a brown blotch on the lip; they have but little scent. I have seen a small Rhynchophorous beetle creeping about among the flowers with the pollen masses on its head.

P. KINGII, *Hook. f., Fl. Brit. Ind.*, v. p. 708, *et Ic. Pl.*, t. 2015.

Hab. Perak: *C. Curtis!* v.s.

In Curtis's plant I find the lateral lobes of the lip smaller and the medium lobe larger in proportion than in Hooker's figure.

P. LINEARIS, *Ridl., sp. nova.* Cæspitosa, terrestris. *Rhizoma* crassum, lignosum. *Pseudobulbi* 1½ poll. longi, elongati, conici, a vaginis membranaceis tecti. *Folium* ultra pedale, ½ poll. latum, lineari-lanceolatum, obtusum, basi longe angustatum. *Scapus* 8 poll. longus, gracilis, nudus; racemus 4 poll. longus. *Flores* parvi, albescentes. *Bracteæ* lanceolatæ, acutæ; pedicelli ⅛ poll. longi, cum ovariis æquilongi. *Sepala* linearia, trinervia. *Petala* ¼ poll. longa, uninervia, sepalis subsimilia. *Labellum* ¼ poll. longum, lineare, obtusum; lobi laterales vix distincti, apice acuti; carinæ 2 crassæ basi elevatæ, tertia mediana vix elevata. *Columna* arcuata, elongata, in dorso acute carinata; stelidia magna, lanceolata acuminata acuta, versus columnæ basin exorta, clinandrii marginem denticulatum superantia. *Anthera* longe rostrata; rostellum elongatum, triangulare. *Stigma* a margine incrassato producto basi auctum.

Hab. Kedah: Kedah Peak, 3,000–4,000 feet alt., very abundant, forming large masses on the ground!

This *Platyclinis* was nearly out of flower at the time of my visit to Kedah Peak in August; but I succeeded in finding some few sprays of flowers and half-ripe fruits. The flower is nearly white. The lip is remarkably narrow, and the lateral lobes very obscure. In the dried specimens, the lip is coiled up at the end, like a butterfly's tongue. The narrow petals, sepals, and lip are distinctive marks of the species.

PLATYCLINIS GRACILIS, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 708, *et Ic. Pl.*, t. 2016.
Hab. Perak: *King's Collector.*

P. LINEARIFOLIUM, Ridl. *Dendrochilum linearifolium*, Hook. f., Fl. Brit. Ind., v. p. 782, et Ic. Pl., t. 1859.
Hab. Malacca: Mt. Ophir!
Perak: *Scortechini;* Batang Padang, *Wray.*

Common on trees on Mount Ophir at 4,000 feet elevation, flowering in May. The Ophir plant is evidently that figured in the Icones, from Perak, and seems to me certainly a *Platyclinis.*

DENDROBIUM, Swartz.

This large genus is by no means easy to break up into satisfactory groups; the best characters for classifying the species appear to be those of the stem. The genus can first be broken up into two series: one with the primary stem branched and usually extensively developed; the other, with a short unbranched primary stem. To the first series belong *Sarcopodium*, with an elongate creeping rhizome throwing up two-leaved, *i.e.*, binodal pseudo-bulbs, such as *D. Treacherianum*, Reichb. f., *D. geminatum*, Lindl.; and among aberrant forms *D. funiforme*, Blume, must be placed here. *D. longicolle*, Lindl., must be excluded, as it has no creeping rhizome, or at least it is exceedingly short; it is evidently nearest to *D. heteroideum*, Blume, and *Cadetia angustifolia*, Blume, and may be classed as a *Cadetia*. This name has been used (Fl. Brit. Ind.) for a section for which I propose to retain the old name of *Desmotrichum*, a generic name given by Blume for several of the species included in it, such as *Desmotrichum fimbriatum* and *D. convexum*. This section is a very distinct one in possessing an extensively branched stem, with usually a creeping primary stem, and the terminal nodes of each branch dilated into a terete or flattened pseudo-bulb, bearing a single (rarely and only exceptionally a second) leaf.

Bolbidium is retained as a section for a few plants with a distinct but short primary stem and paucinodal pseudo-bulbs bearing a pair of leaves.

The remaining species have a very short primary stem and tufted polynodal secondary stems, which are but seldom branched. Many species emit lateral shoots when the terminal bud is destroyed, and several species normally emit lateral shoots, such, for instance, as *Dendrobium inconcinum*, Ridl., and *D. prostratum*, Ridl., which latter, though closely allied to the tufted crest, *D.* (§ *Aporum*) *Leonis*, Reichb. f., has taken on a creeping habit, and emits roots from the underside of the stem and branches in every direction. Most of the species have terete or more or less compressed secondary stems, rarely dilated into pseudo-bulbs properly so-called. The section *Clavatæ* has some of the lower internodes swollen into a fusiform shape. *D. lamellatum*, Lindl,, has a shortened polynodal stem, broadly dilated upwards but very thin. I have referred it to the *Pedilonum* section on account of the form of its flowers.

The whole of this series can be broken up into those with persistent leaves, *i.e*, that bear flowers on the leafy stems and those that bear them on the old stems only after the leaves have fallen. To the first series belong—

Aporum, Blume, with its flattened stem and leaves;

Strongyle with subterete acute leaves;

Virgatæ with a tall, slender stem and narrow linear leaves;

Clavatæ with stems similar to the last, except that several nodes at the base are more or less swollen;

Distichophyllæ with stout stems with usually short distichous leaves, and a very distinct form of flower

Breviflores resembling the next series, but with the terminal leaves persistent, and short broad flowers—not a very good section.

Of the large series with the flowers borne on leafless stems, *Pedilonum* is distinguished by its long mentum and comparatively short sepals and petals, but there are many species intermediate between typical Pedilonums (such as *D. secundum*, Lindl.) and the remaining section *Eudendrobium*.

The *Eudendrobia* are but scantily represented here. The large section of *Speciosæ*, plentiful in Burma, hardly descend as far south as our region. The *Antennatæ* (*D. strebloceras*, Reichb. f., *D. antennatum*, Lindl., &c.), characterised by their erect elongate twisted petals, are strictly Papuan, and apparently do not occur even so far west as Borneo. The absence of the *Formosæ* section is more remarkable, as it is well represented in Borneo as well as in Burmah. The constant rain without any dry period in this region is doubtless the cause of the absence of many species such as the *Speciosæ*, which require a period of rest in order to produce flowers; many species of which hardly exist even under careful cultivation in our climate.

DENDROBIUM (§ SARCOPODIUM) GEMINATUM, *Lindl.*, *Gen. et Sp. Orch.*, p. 77; *Hook. f.*, *Fl. Brit. Ind.*, v. p. 713.

Hab. Perak: Gunong Hijan, Larut Hills!
Kedah: Kedah Peak, abundant!

This plant creeps far among moss on rocks and stumps of trees. The flowers are white, with yellow and brown marks on the lip.

D. MACROPODUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 713.

Hab. Perak: *Scortechini*, *Wray*.

D. LONGIPES, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 713.

Hab. Perak: *Scortechini*.

D. PERAKENSE, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 712.

Hab. Perak.

Scortechini's drawing of this appears to represent *Eria stellata*, Lindl. I have seen no specimen.

D. (§ CADETIA) LONGICOLLE, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 74; *Hook. f.*, *Fl. Brit. Ind.*, v. p. 712.

Hab. Singapore: Sungei Morai!

This very curious species was first found by Cuming, in Singapore, and sent home alive. It is very local here, but when it occurs is found in large clumps. It grows with *Platyclinis longifolia*, Hemsl., on stumps in dry, sandy woods near mangrove swamps. There is only one leaf on each pseudobulb, but above this is a dry, brown sheath, which wraps the base of the ovary and the short pedicel of the flower. The flowers are solitary, and are produced two or three times a year. They last but a few hours. I have never seen fruit, which must be very rarely produced.

DENDROBIUM (§ BOLBIDIUM) PUMILUM, *Roxb.*, *Hort. Beng.*, p. 63; *Fl. Ind.*, iii. p. 479.

Hab. Singapore: Kranji! Selitar! Bajau!
Johore: Kota Tuiggi! Kwala Sembrong, *Lake and Kelsall!*
Malacca: !
Sungei Ujong: Bukit Kupayiang!
Pahang: Pekan!
Penang: Pulau Tikus! *C. Curtis.*
Perak: *Scortechini.*
Rhio!. Borneo!

A common little plant in mangrove swamps, orchards, and open country. The plain yellow form and the one veined with red occur mixed. It generally grows on trees low down. In Sungei Ujong it is called "*Sakat Kalumbai*," and the roots are boiled and applied in cases of dropsy. *D. carnosum*, Teysm. et Binn. in Tijdschr. Nederl. Ind., v. (1853) p. 489, seems to be intended for this species.

The section, § *Desmotrichum*, includes the species given under *Cadetia* in the Flora of British India, but not the Cadetias of Blume and Gaudichaud, which form, as it seems to me, a very distinct section of themselves. The name was originally given by Blume to a number of species of *Dendrobium*, most of which I would retain in this section, while others evidently belong to the *Sarcopodium* section. In *Desmotrichum* the primary stem is sometimes elongate and creeping, and sometimes short, but in any case it throws up many slender polynodal stems, which branch again and again, and each branch is terminated by a pseudo-bulb composed of one, rarely two, internodes: one, the lower, very large and dilate; the other, when present, very short. The lower one bears a broad, more rarely narrow, somewhat coriaceous leaf, from the axil of which are emitted one or two inflorescences. These are racemose, but, as a rule, only one flower is produced at a time. The two inflorescences are not synchronous, but develop one after the other at considerable intervals of time. They are enclosed at the base by two bracts, dry and cartilaginous, which eventually break up before flowering into fibrils. In

D. Kunstleri, Hook. f., the inner bract in the bud exudes a deep crimson, oily, viscid liquid in drops, which probably serves to protect the bud from the action of water. This, when the flower is open, remains in the now dry bract in the form of red spots. In *D. criniferum*, Lindl., the arrangement is much the same, but the plant is rather peculiar among Desmotrichums in throwing up tall, erect shoots, each internode of which is enwrapped in a sheathing leaf, narrowed at the base and broadly dilated above. These soon drop off, leaving the slender, erect stem bare. Meanwhile, the terminal internode enlarges and produces the leaf, and eventually the flowers. Then, from the node below the dilated terminal internode (but often also from other nodes) another lateral shoot is produced, which develops in the same manner. In this plant also there are several inflorescences in each axil, which develop singly, more rarely two together, at long intervals of time, and inflorescences are often also emitted from nodes which have never borne a fully developed leaf. The inflorescence which appears to terminate the stem is really emitted from the axil of the leaf, so that it is strictly axillary, though the arrested development of the stem above the leaf makes it appear as if it was terminated. Like many other orchids in the Malay Peninsula, Desmotrichums have no definite flowering season, but at intervals of a few months every individual of the same species flowers on the same day.

But two species are described from the Malay Peninsula, although many more occur. This is due to the fugaciousness of the flowers, which last but a few hours in the morning, and so are seldom to be met with by collectors. They are also very thin textured and preserve badly. To describe these plants properly it is essential to cultivate them and examine the flowers during life. Another difficulty in working from dried material arises from the alteration in form of the pseudo-bulb under pressure. Very good characters are to be obtained from the form of the pseudo-bulb, but these have been often overlooked or misunderstood: thus, *D. Macræi*, Lindl., *D. lonchophyllum*, Hook. f., and *D. Kunstleri*, Hook. f., have all been described, simply as having fusiform pseudo-bulbs, whereas during life they are quite different in shape from each other. The best way of classifying the species is, I believe, by the form of the lip. Thus—

Terminal lobe of lip not broader than the lateral lobes (*i.e.*, when the lip is spread out).

(A) Lip glabrous; apex bilobed.

- D. lonchophyllum, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 714.
- D. convexum, *Lindl.*, *Gen. et Sp. Orch.*, p. 76.
- D. Kelsalli, *Ridl.*
- D. angustifolium, *Lindl.*, *Gen. et Sp. Orch.*, p. 76.
- D. appendiculatum, *Lindl.*, *l.c.*

(B) Lip bearded; apex entire.

- D. criniferum, *Lindl.*, *Bot. Reg.* (1844) *Misc.*, p. 41.
- D. Zollingerianum, *Teysm. et Binn. in Tijdsch. Nederl. Ind.*, xxiv. (1862) p. 313.
- D. comatum, *Lindl.*, *Gen. et Sp. Orch.*, p. 76.
  These two are probably identical with the preceding.
- D. angulatum, *Lindl.*, *l.c.*, p. 76.
- D. Scopa, *Lindl.*, *Bot. Reg.* (1842) *Misc.*, p. 55.

Terminal lobe much broader than laterals, fan-shaped, when expanded almost entire; margins waved.

(C)
- D. Kunstleri, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 714.
- D. Macræi, *Lindl.*, *Gen. et Sp. Orch.*, p. 75.
- D. fimbriatum, *Lindl.*, *l.c.*, p. 76 (non Hook. f.).
- D. roseo-punctum, *Ridl.*
- D. pallidiflorum, *Ridl.*
- D. grandiflorum, *Lindl.*, *Gen. et Sp. Orch.*, p. 77.
- D. pallens, *Ridl.*

Terminal lobe as in Section C, but lacerate or fimbriate.

(D)
- D. Cælopogon, *Reichb. f.*, *Xenia Orch.*, ii. p. 23, t. 109.
- D. Hasseltii, *Lindl.*, *Gen. et Sp. Orch.*, p. 87.
- D. striolatum, *Reichb. f. in Hamb. Gartenz.*, xiii. (1857) p. 313.
- D. laciniosum, *Ridl.*

DENDROBIUM LONCHOPHYLLUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 714, *et Ic. Pl.*, t. 2018.

This is common in the Malay Peninsula, especially in the south, often growing in clumps on the boughs of mangroves.

Abundant in Singapore, Johore, and also in Perak.

The stems are much branched, and swollen at intervals into club-shaped pseudo-bulbs, but slightly flattened, polished, ridged, and grooved. The flowers appear singly or in pairs, on the short raceme, sunk in a depression in the pseudo-bulb below the leaf. They are small and fugacious, yellowish, with pink stripes on the sepals and petals. The lip is narrow, oblong spathulate, with two thin inflexed narrow lobes; terminal lobe bifid, with the lobes oblong and rounded; three low ridges run along the lip to the base of the mid-lobe, where two converge to a point. The centre of the lip to the epichil is crimson, the lateral lobes pink; the terminal lobe is yellow. The flowers are very fugacious, lasting but a day.

DENDROBIUM KELSALLI, *Ridl.*, *sp. nova.* *Caules* plures aggregati, 15 poll. longi, teretes, flavi. *Pseudo-bulbi* 1 poll. longi, $\frac{1}{8}$ poll. lati, subfusiformes, teretes nec compressi, curvuli, politi, flavi. *Folia* $1\frac{1}{2}$ poll. longa, $\frac{1}{4}$ poll. lata, lanceolata, subobtusa, coriacea, canaliculata nec carinata. *Flores* parvuli; pedicelli (ovario viridi incl.) $\frac{3}{8}$ poll. longi. *Sepalum* posticum ovatum obtusum, lateralia multo majora $\frac{1}{4}$ poll. longa et lata late ovata obtusa; mentum grande, latum, obtusum, in medio dilatatum. *Petala* sepalo postico minora lorata, obtusa, pallide viridia. *Labelli* basis angusta; lobi laterales late, obtusi, erecti, virescentes; discus kermesino-purpureus, 3-carinatus; carinæ subæquales in basi lobi medii terminatæ; lobus medius hippocrepiformis, rotundatus, 2-lobus; lobi paralleli, læte pallide aurantiacei. *Columna* subrecta, virescens; anthera obtusa; stelidia dentiformia, erecta, acuta. *Stigma* late oblongum.

Hab. Selangor: Bukit Hitam, *Lieut. Kelsall!*
Pulau Aor: east coast of Johore, *J. Fielding!*
Perak: Maxwell's Hill!
Malacca: Mt. Ophir!
Kedah: Kedah Peak, Gunong Jerai!

This species is common on trees in the hilly districts. It is distinguished from *D. lonchophyllum*, Hook. f., by its slenderer form, smaller in all parts, shorter mentum, and horse-shoe shaped mid-lobe of the lip.

D. convexum, Lindl., Gen. et Sp. Orch., p. 76; Reichb. f., Xenia Orch., ii. p. 73, t. 118, I only know from the author's figure and description. It seems to have a creeping stem emitting roots, and the mid-lobe of the lip is longer and narrowed at the base. It was collected by Blume at the foot of Mt. Salak, in Java.

D. xantholeucum, Reichb. f., Xenia Orch., ii. p. 73, t. 118, was described by the author from a drawing in Kuhl and Hasselt's collection. It is remarkable for having a single keel running the whole length of the lip. As this is most unusual in this section and may be a misinterpretation of the original drawing, the plant must remain doubtful till further specimens are obtained.

DENDROBIUM CRINIFERUM, *Lindl.*, *Bot. Reg.* (1884), *Misc.*, p. 41. *Caules* ramosissimi, erecti, plures, usque ad 2 ped. longi, flavi, nitidi; internodi teretes, apice paullo incrassati. *Pseudo-bulbi* in apicibus ramorum siti, crassi. *Folia* 3 poll. longa et lata, elliptica vel ovato-elliptica, obtusa, coriacea; carina caniculata distincta, nervi conspicui. *Racemus* $\frac{1}{4}$ poll. longus, a vaginis bruneis tectus. Flores bini; ovaria gracilia, viridia; pedicelli (ovariis incl.) $\frac{3}{4}$ poll. longi. *Sepala* $\frac{3}{8}$ poll. longa (posticum paullo minus), patentia, lanceolata, acuta, straminea; mentum brevissimum, latum, obtusum, apice purpureo - punctatum. *Petala* sepalis breviora, linearia, straminea. *Labellum* cum sepalis lateralibus æquilongum, basi angustum 3-lobum; lobi laterales arcuati, acuti, straminei, intus kermesino-lineati; disci straminei vel purpureo-maculati carinæ 2, kermesinæ, in lobum medium incurrentes, in hoc loco sinuatæ; lobus medius linearis elongatus, in margine sinuatus, apice præsertim a filiamentis flavis tortis tectus. *Columna* brevis, crassiuscula, alba purpureo-punctata; anthera majuscula, smaragdina; rostrum latum; pollinia oblonga, flava; stelidia erecta, dentiformia, acuta. *Stigma* magnum, obovatum. *Reichb. f. in Walp. Ann.*, vi. p. 303. *D. Zollingerianum*, Teysm. et Binn. in Tijdsch. Nederl. Ind., xxiv. (1862) p. 313. *D. comatum*, Lindl., Gen. et Sp. Orch., p. 76. *Desmotrichum comatum*, Blume, Bijdr., p. 230? *Calyptranthera fimbriata*, Blume, MS.

Hab. Singapore: Kranji! Changi! Sungei Morai!
Rhio!
Johore: Batu Pahat, *Lake and Kelsall!*

This plant forms large clumps on trees usually near the sea. It was first described by Lindley from a plant introduced by the Duke of Northumberland, who received it from Mr. Power from Ceylon. It does not seem to have been since seen wild there, and as some other strictly Malayan orchids, *e.g.*, *Dendrobium sanguinolentum*, Lindl., and *D. crumenatum*, Sw., are also recorded in the same manner, it is reasonable to suppose that Mr. Power obtained these plants from the Malay Peninsula.

D. Zollingerianum, Teysm. et Binn., seems from the description to be this species; and I suspect *D. comatum*, Lindl. (*Desmotrichum comatum*, Blume), is the same thing. If so, this is the oldest name for the species. There is a flowerless specimen of what appears to be this in the Buitenzorg Herbarium, with the name *Calyptranthera fimbriata*, in Blume's handwriting, a name never taken up as far as I know.

The flowers have a faint scent of cowslips.

DENDROBIUM KUNSTLERI, *Hook. f., Fl. Brit. Ind.*, v. p. 714. *Caules* repentes, validuli; rami crassi, suberecti, teretes, politi. *Pseudo-bulbi* 2 poll. longi, 1 poll. lati, ½ poll. crassi, ovati, compressi, olivacei vel purpurascentes. *Folium* 5–6 poll. longum, 2 poll. latum, ovatum ovato-lanceolatum aut lanceolatum, obtusum, coriaceum, carinatum et costatum, atroviride (juvene purpureum). *Flores* sæpius singulatim expansi; pedunculi ½ poll. longi, albi. *Bracteæ* 2, ovatæ, lanceolatæ, in fibrillos mox solutæ. *Bractea floralis* minima, ovata, alba; pedicellus eum ovario ½ poll. longus, albus. *Sepala* ¾ poll. longa, ⅛ poll. lata (vel latiora), lanceolata acuta, recurva; mentum cum sepalis æquilongum (vel longius) rectum, conicum, subacutum. *Petala* cum sepalis æquilonga multo angustiora, linearia, recurva, ochrolenca, roseo-maculata. *Labellum* basi anguste lineare stramineum, in apice loborum lateralium roseum; lobi laterales angusti, acuti, medius pandurato-oblongus marginibus plicatis erectis; carinæ 2, crassæ, in disco rectæ, in lobo medio sinuatæ, tertia media in disco recta minus elevata. *Columna* recta, ventre excavato; stelidia et filamentum erecta, dentiformia, acuta. *Anthera* oblonga, apice rotundata. *Stigma* profundum, rotundatum. *D. Flabellum*, Reich. f., Xenia Orch., ii. p. 75, t. 118.

Hab. Singapore: Bukit Tomali! Kranji! Changi!
Johore: Batu Pahat, *Lake and Kelsall!*
Siam: Ghirbee, *Curtis!*
Perak: *Scortechini!*

A common and somewhat variable plant, with for the section rather showy sweet-scented flowers. I imagine Reichenbach's *D. Flabellum* is intended for this, but he says that that has three sinuate keels.

D. Kunstleri, Hook. f., has three keels on the disc between the mid-lobe, the two outer of which only are carried on to the mid-lobe, and are there sinuous.

DENDROBIUM ROSEO-PUNCTATUM, *Ridl.*, *sp. nova.* *Caules* repentes; rami 6–8 poll. longi, graciles. *Pseudo-bulbi* 2 poll. longi, ½ poll. lati, ¼ poll. crassi, fusiformes, paullo compressi, utrinque attenuati, leves, olivacei. *Folium* 6 poll. longum, ¾ poll. latum, lanceolatum, loratum, obtusum, carinatum, basi attenuatum, atro-viride. *Inflorescentia* subterminalis; pedunculus bracteas ¼-poll. longas paullo superans, albus. *Flores* mediocres; bractea floralis minuta, ovata, alba. *Ovarium* incrassatum. *Sepala* subæqualia, ½ poll. longa, ⅛ poll. lata, lanceolata, acuta, patentia nec reflexa; mentum breve, latum, obtusum, decurvum. *Petala* linearia, alba. *Labellum* ¾ poll. longum; lobi laterales breves, acuti, curvati intus kermesino-punctati, medius flabellatus obcordato-emarginatus ochroleucus; carinæ 2 (tertia mediana vix elevata), in disco rectæ, in lobi medii isthmo magis elevatæ, sinuatæ, plicatæ, kermesinæ. *Columna* brevis, superne attenuata, rufo-punctata; stigma rotundum; stelidia brevia, antheram haud superantia.

Hab. Malay Peninsula: in Hort. Bot. Singapore culta.

Allied to *D. Kunstleri*, Hook. f., but distinct in its strictly fusiform pseudo-bulbs elliptic in section, narrower leaf, sepals and petals pure white, column and side-lobes of lip much shorter, isthmus longer, keels large, sinuate diverging at the middle, not running on to the lamina of the mid-lobe (though there is a faint trace of them there).

D. PALLIDIFLORUM, *Ridl.*, *sp. nova.* *Caules* graciles, ramosi, flavi. *Pseudo-bulbi* 1½ poll. longi, ½ poll. lati, $\frac{3}{16}$ poll. crassi, complanati, elongato-ovoidei, tenues, rugosuli, flavo-virides. *Folia* 3 poll. longa, 1 poll. lata, ovata, acuta, tenuiter coriacea, carinata et canaliculata. *Racemi* brevissimi, in bracteis pluribus ½ poll. longis bruneis inclusi; pedicellus, ovario incluso, ¼ poll. longus. *Flores* singuli, parvi; bractea floralis ovario brevior, ovata, lanceolata, acuta, purpureo-punctata. *Sepalum* posticum ¼ poll. longum ovato-lanceolatum obtusum reflexum, lateralia multo majora ovata obtusa; mentum sepalo paullisper longius, subrectum, obtusum. *Petala* cum sepalo postico æquilonga, lanceolata, porrecta, pallide flavescentia ferme alba. *Labelli* lobi laterales erecti triangulares elongati acuti, medius triangularis emarginatus flavus in margine sinuatus lobis obtusis; carinæ 2, magnæ, basi rectæ, in lobo medio sinuatæ carinâ intermediâ rectâ additâ. *Columnæ* pes rectus; stelidia erecta, ovata, subacuta. *Anthera* smaragdina, apice obtusa; rostrum ovatum, brevissimum; pollinia æqualia, lineari-oblonga; caudiculus longus. *Stigma* latum nec profundum, transversum, ovale. *Rostellum* subelongatum, porrectum, truncatum, bifidum, lobis parallelis.

Hab. Singapore: mangrove swamps, Kranji!

A small straggling plant with weak stems, the flowers small yellowish-white, with the terminal lobe of the lip brighter yellow, and the anther and a spot at the apex of the column foot bright emerald green. It is very distinct in its thin, broad pseudo-bulbs and the form of the mid-lobe of the lip, which is broader than the lateral lobes, and so deeply emarginate that it is almost bi-lobed.

DENDROBIUM PALLENS, *Ridl., sp. nova.* *Caules* 10 poll. longi, rami subteretes, flavo-virides. *Pseudo-bulbi* $1\frac{1}{4}$–$1\frac{3}{4}$ poll. longi, $\frac{3}{8}$ poll. crassi, paullo complanati ferme cylindrici, longitudinaliter rugosi, flavi. *Folium* 3 poll. longum, 1 poll. latum, oblongum vel oblongo-lanceolatum, obtusum, coriaceum, carinatum, canaliculatum, striatum. *Racemus* brevis, in bracteâ $\frac{1}{4}$ poll. longâ siccâ flavâ involutus. *Bractea* floralis parva, ovata, mucronata, ad pedicellum arcte appressa; pedicellus cum ovario $\frac{3}{8}$ poll. longus, viridis. *Flos* singulus, nutans, mediocris. *Sepala* subæqualia, $\frac{1}{2}$ poll. longa $\frac{3}{16}$ poll. lata, oblongo-lanceolata, recurva, pallide viridia; mentum $\frac{1}{4}$ poll. longum, obtusum, viride cum sepalis lateralibus sæpe roseopunctatum. *Petala* minora, lineari-lanceolata, acuta. *Labellum* album; lobi laterales falcati acuti, medius obcordatus profunde emarginatus lateralibus multo latior, apice divaricati obtusi truncati in marginibus sinuati; carinæ 2, altæ, in disco rectæ, in lobo medio sinuatæ, tertiâ medianâ rectâ additâ. *Columna* brevis, crassa, viridis; pes longus; margines elevati; clinandrium vix profundum. *Anthera* conica, truncata; pollinia oblonga; stelidia parva, recta, dentiformia. *Stigma* rotundatum, margine basali rectum. *Capsula* oblonga, basi angustata; costæ steriles lineares, fertiles duplo latiores in dorso rotundatæ.

Hab. Siam: Bangkok!

Brought down by natives and cultivated in the Singapore

Botanic Garden. The species somewhat resembles the last, but differs in the form of the pseudo-bulb, which is oval in section, and in the form of the lip, which has the strongly plicate edge of *D. Kunstleri*, Hook. f. The flowers are as inconspicuous as those of *D. pallidiflorum*, Ridl., the sepals and petals being of a dull green more or less spotted with pink, the lip white. They have a scent of cloves.

I received also from native collectors a similar plant from Djainbi, in Sumatra, which differed slightly in the less plicate edge of the lip, broader terminal lobe with a short mucro in the notch, and broader sepals; the flowers were entirely cream colour except for the emerald-green anther.

DENDROBIUM LACINIOSUM, *Ridl., sp. nova.* *Caules* pedales vel ultra, erecti, validuli, a fibrillis vaginarum vetustarum tecti; rami plures. *Pseudo-bulbi* 2–$1\frac{3}{4}$ poll. longi, $\frac{3}{4}$ poll. lati, vix $\frac{1}{8}$ poll. crassi, ovoideo-elliptici, plani, admodum tenues, rugosi, flavovirides. *Folium* 4 poll. longum $1\frac{1}{2}$ poll. latum, lanceolatum, obtusum, tenuiter coriaceum, læte virens. *Racemus* ultra 1 poll. longus, a bracteis ovato-lanceolatis bruneis tectus. *Flos* singulus, mediocris, pallide flavus. *Sepala* subæqualia, $\frac{1}{4}$ poll. longa, late lanceolata, apice incrassata obtusa; mentum $\frac{1}{4}$ poll. longum, curvatum, obtusum. *Petala* sepalis angustiora, lanceolata acuta. *Labelli* lobi laterales ovato-oblongi falcati, medius basi linearis superne transverse oblongus truncatus multo latior irregulariter digitatus; carinæ 2, elevatæ, in disco rectæ, in lobi medii ungue sinuatæ. *Columna* alba; clinandrium subprofundum. *Anthera* oblongo-quadrata, obtusa, in margine antico fimbriata; stelidia erecta, dentiformia; rostellum parvum, rotundatum, lamelliforme. *Stigma* profundum, subquadratum.

Hab. Singapore: Pulau Selitar! (in the Johore Strait.)

Near *D. calopogon*, Reichb. f. This species is peculiar among the peninsular species in having the expanded blade of the mid-lobe of the labellum laciniated.

D. (§ STACHYOBIUM) TRINERVIUM, *Ridl., sp. nova.* *Caules* 3 poll. longi, $\frac{1}{4}$ poll. crassi, plures congesti, flexuosi, succulenti, paucinodi; internodi $\frac{1}{2}$ poll. longi, teretes, striati. *Folia* $2\frac{1}{2}$ poll. longa, $\frac{1}{2}$ poll. lata, lanceolata, succulenta, carinata, apice inæqualiter biloba; lobi acuti, mucrone interjecto. *Flos* singulus, lateralis, pendulus; pedunculus $\frac{1}{4}$ poll. longus. *Bracteæ* binæ, $\frac{1}{16}$ poll. longæ, ovato-lanceolatæ, acutæ; ovarium cum

pedicello ¾ poll. longum. *Sepalum* posticum ¼ poll. longum ovato-oblongum acutum, sepala lateralia multo majora; mentum ¼ poll. longum, obtusum. *Petala* sepalis minora, lanceolata, mucronata, alba. *Labellum* ¾ poll. longum, ⅜ poll. latum, oblongum, panduratum, retusum, citrinum basi purpureo-punctatum; carinæ 3, elevatæ, læte virides, in basi lobi medii abrupte terminatæ incrassatæ. *Columna* brevis, lata, alba. *Anthera* depressa.

Hab. Siam: Pungah, *C. Curtis.*

A very dwarf species, with single lateral white flowers, of doubtful affinity. *D. alpestre*, *D. Roylei*, &c., differ by the subterminal flower.

DENDROBIUM (§ APORUM) SERRA, *Lindl. in Journ. Linn. Soc.* (*Bot.*), iii. (1859) p. 3.

A very common species occurring on trees on river banks, mangrove swamps, orchards, and such places in the low country. In hot wet places the whole plant often becomes of a bright red colour. The flowers are always white. The capsule is a quarter of an inch long, pendulous, unequally pear-shaped, *i.e.*, with one side longer than the other, the barren ribs narrow lorate, the placentiferous ones much broader and lanceolate in outline.

Hab. Singapore: Very common, Kranji! Changi! Rhio!
Johore: Tana Runto! Kota Tinggi! Kwala Kahang! Batu Pabat!
Malacca: Sungei Rambei!
Selangor: Kwala Lumpor! Seppan River!
Penang!
Pahang: Kwala Pahang!
Also Java and Borneo!

D. (§ APORUM) RHODOSTELE, *Ridl. in Trans. Linn. Soc.*, Ser. II. (Bot.), iii. (1893) p. 360.

Hab. Pahang: Jahan River, on trees in thick jungle.

D. (§ APORUM) ROSELLUM, *Ridl. in Journ. Linn. Soc.* (*Bot.*), xxxi. (1896) p. 268.

Hab. Johore: Gunong Panti!

D. (§ APORUM) GRANDE, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 724.

Hab. Johore: Kidala Sembrong!
Selangor: Kidala Lumpur!
Pahang: Jahang River Woods!

This usually grows on lofty trees. It is not very common, rarely met with in flower, nor does it often flower in cultivation.

DENDROBIUM (§ APORUM) COCHINCHINENSE, *Ridl., sp. nova.* Herba *D. Serra* admodum affinis, quoad habitum similis sed multo major. *Caules* 1½ ped. longi, ¾ poll. lati. *Folia* 1 poll. longa, ¾ poll. lata, late ovata, iis *D. Serra* tenuiora obtusiora. *Flores* iis *D. Serra* similes, sed duplo majores, ferme ¼ poll. longi, albi. *Sepala* oblonga, lorata; mentum breve, ovario et pedicello multo brevius. *Petala* lanceolata. *Labellum* basi anguste oblongum; lobi laterales parvi rotundati, medius latus obovatus hypochilio multo latior rotunde bilobus; callus furcatus, conspicuus, basi lobi medii situs. *Columna* brevis, crassa; pes brevissimus; clinandrium latum, nec profundum. *Anthera* pileata, truncata, lata, apice obtusa; rostellum breve, crassum, linguæforme. *Stigma* magnum latum.

Hab. Cochin-China: Saigon, *Haffner!* Culta in Herb. Bot. Singapore.

This species is very closely allied to *D. Serra*, Lindl., but is distinct in its broader leaves and stems, remarkably short foot of the column, and correspondingly short mentum, and especially in the very much broader mid-lobe of the lip, which in *D. Serra*, Lindl., is but little shorter than the basal portion.

D. (§ APORUM) SINUATUM, *Lindl., e Reichb. f. in Walp. Ann.*, vi. p. 280.

Hab. Singapore: Selitar! Kranji! (common among mangroves.)
Johore: Batu Pahat!

This much resembles *D. atropurpureum*, Miq., but is a taller plant with shorter leaves. There are a number of bracts at the base of the peduncle, but they do not break up into fibrils as in *D. atropurpureum*, Miq. The flowers are larger, orange yellow, the petals tipped with red. The lip is pale red with a darker callus composed of two club-shaped caruncles meeting in a V shape (that of *D. atropurpureum*, Miq., is semicircular). The tubercle under the lip is like that of *D. atropurpureum.* At the base of the lip are two very small lanceolate or tooth-like acute lateral lobes. The column is pale red with a darker spot at the base.

D. (§ APORUM) EULOPHOTUM, *Lindl. in Journ. Linn. Soc.* (*Bot*)., iii. (1859) p. 5.

Hab. Singapore: Kranji! Bajan!
Rhio: *Native collector.*
Pahang: Pekan!
Laukawi: Terutan, *Curtis!*

Common low down on trees, especially mangroves, in the low country. Flowers all the year. The flowers are yellow, striped on the inner face with red.

DENDROBIUM (§ APORUM) RHIZOPHORETI, *Ridl., sp. nova.* *Caules* ultra pedales, ramosi, penduli, undique foliati. *Folia* 1 poll. longa, $\frac{1}{4}$ poll. lata, oblonga, acuminata, acuta, pallide viridia, in sicco nigricantia. *Capitula* lateralia, pauci-bracteata. *Flores* $\frac{5}{8}$ poll. lati, inversi. *Sepala* flavescentia, posticum oblongum subacutum, lateralia multo majora late ovata subfalcata; mentum sepalis brevius, latum oblongum obtusum. *Petala* sepalis multo minora, linearia, flavescentia (lineâ medianâ roseâ). *Labelli* unguis linearis, roseus; lamina subreniformis, lata, abrupte deflexa, flavescens, apice acuta, in margine sinuata; callus in disco ruber; dentes 2, subulati, basi incrassati. *Columnæ* pes longus, linearis, rubro-maculatus; clinandrium parvum, profundum. *Anthera* parva, ovoidea, flava; caudiculus brevis; rostellum oblongum, integrum.

Hab. Singapore: Kranji! Sungei Buloh!
Johore: Batu Pahat! Tana Runto! Hulu Sembrong! (n. 4038.)
Perak: *Scortechini* (delineatio).

This species is allied to *D. eulophotum*, Lindl., and indeed has been confused with it. However, it is very distinct. It is a longer and weaker plant, the leaves are thin, of the texture of those of *D. grande*, Hook. f., and not fleshy like those of *D. eulophotum*, Lindl. The flowers are larger, and have a more distinct mentum, and are quite differently coloured, the petals are narrower and longer, the lip has a long claw, ending in a semi-linear broad deflexed blade, the ends long and acute. The callus consists of two setaceous curved processes swollen at the base where they are connate.

There is a good sketch of this in Scortechini's drawings, as well as one of *D. eulophotum.*

D. TERMINALE, *Par. et Reichb. f. in Trans. Linn. Soc.*, XXX. (1874) p. 149.

Hab. Malacca: (Ic. in Herb. Calc.), not seen.

DENDROBIUM (§ APORUM) MANNII, *Ridl., sp. nova*. *Caules* 5–6 poll. longi, erecti, congesti, complanati. *Folia* $\frac{3}{4}$ poll. longa, $\frac{1}{2}$ poll. lata, lanceolata acuta, lætevirentia, iis *D. cochinchinensis* ferme similia. *Flores* in racemis axillaribus brevissimis (in caulibus nudis, foliis delapsis, sitis) sæpissime bini, iis *D. Leonis* similes sed minores tenuiores, primulini, inodori; pedicelli $\frac{1}{4}$ poll. longi, graciles, recti vel nutantes; ovarium breve. *Sepalum* posticum ovato-oblongum, lateralia multo majora ovata triangularia obtusa falcatula; mentum cum sepalo $\frac{3}{8}$ poll. longum, crassum, curvum, obtusum. *Petala* sepalis multo minora, linearia, lorata. *Labellum* oblongum, cuneatum; lobi laterales deflexi abrupte truncati, medius 2-lobus lobis approximatis rotundatis crispulis quam lobi laterales paullo longioribus; discus primulinus a maculâ ochreâ ornatus. *Columna* subrecta, angusta, basi ocreo-maculata, in ventre plana. *Anthera* plana, in clinandrio immersa, margine recto truncato; loculi disjuncti; pollinia 4, obovata, flava; stelidia 0. *Stigma* ovato-scutiforme; discus viscidus, citrinus.

Hab. Assam: *G. Mann!*.
Malacca: Mt. Ophir district, *Derry!*.

(Flowered in Hort. Bot. Singapore, Nov., 1890, and Jan., 1891.)

This is a plant allied to *D. Leonis*, Reichb. f., but remarkable in not having the tuft of bracts as usual in an *Aporum*, but a short distinct raceme. The flowers appear only on the leafless stems, or if, as may happen, the leaves persist, it is merely on the older ones. In most *Apora* one flower appears from each raceme or capitulum at a time, so that the plant may be almost always in flower, yet only a few flowers appear. In *D. Mannii* the whole of the plant is in flower at once, and then after flowering remains quiescent for a time.

D. (§ APORUM) ATROPURPUREUM, *Miq.*, *Fl. Ind. Bat.*, iii. p. 644.

Hab. Singapore: Kranji, Tanglin!
Johore!
Malacca: Sungei Rambei!
Pahang: Pekan, Kwala Pahang!
Selangor: Kwala Lumpur, *Kelsall!*
Penang: Government Hill!
Siam: Singgora! Punga! *Curtis.*
Borneo: Sarawak, *Bishop Hose!*
Java: Buitenzorg, *Treub!*
New Guinea: fide Blume in Rumphia!

Very common upon trees in the low country.

There are two forms of this one, the true *D. atropurpureum* of Miquel with deep brownish-red flowers, the other (*D. concinnum*, Miq.), with yellow flowers, sometimes, but rarely, dotted minutely with deep red. The apex of the lip is ciliate.

DENDROBIUM (§ APORUM) ATRORUBENS, *Ridl., sp. nova.* *Caules* 9 poll. longi, crassi, haud raro ramosi; radices plures, longæ, tenues, atratæ. *Folia* 1 poll. longa, $\frac{3}{8}$ poll. lata, approximata, lanceolata, acuta, in sicco rufo-brunea. *Capitula* terminalia, sæpe magna, $\frac{1}{2}$ poll. longa, $\frac{3}{4}$ poll. in diam., nutantia. *Bracteæ* plures vel plurimæ, $\frac{3}{8}$ poll. longæ, lanceolatæ acutæ, siccæ. *Flores* $\frac{1}{4}$ poll. longi, atro-rubentes. *Sepalum* posticum lanceolatum acutum, lateralia majora triangularia; mentum latum, obtusum. *Petala* sepalis breviora, linearia. *Labellum* lineari-cuneatum, rubrum; lobi laterales breves, dentiformes acuti; apex incrassatus, carnosus, atro-rubens, subtus tuberculatus.

Hab. Kedah: on Gunong Jerai (Kedah Peak) at 3,000 feet elevation on stumps and low trees (5,140)!

Allied to *D. atropurpureum*, Miq., but very much larger. Some specimens have very large heads of flowers, others much smaller.

The flowers much larger than those of *D. atropurpureum*, Miq., of a very deep red colour. The lip is bent in the middle; it is narrow, with a pair of little lateral lobes and a fleshy rounded terminal one, which is thickened and has a tubercle beneath.

D. (§ APORUM) KEITHII, *Ridl., sp. nova.* *Caules* sæpe $1\frac{1}{2}$ ped. longi, usque ad $\frac{3}{8}$ poll. lati, ramosi, debiles. *Folia* usque ad 2 poll. longa, $\frac{1}{4}$ poll. lata, lanceolata, acuminata, falcata, acuta (texturæ *D. grandis*); vaginæ admodum compressæ. *Capitula* plura, axillaria, $\frac{1}{8}$ poll. longa; bracteæ plures, siccæ. *Flores* $\frac{3}{8}$ poll. longi, breviter pedicellati. *Sepalum* posticum ovatum obtusum purpurascens, lateralia latiora; mentum sepalis multo longius, curvum, obtusum. *Petala* sepalis breviora, lanceolata, obtusa. *Labellum* cum sepalis vix æquilongum, cuneato-spathulatum, apice bilobum; lobi rotundati, minute denticulati, involuti basi elevatim 3-nervosi, apice pluri-nervosi; callus 0. *Columnæ* pes longus, excavatus. *Anthera* lata, pileata, in margine recta integra.

Hab. Siam: Bangtaphan, *Dr. Keith!* Pungah, *C. Curtis!*

This plant is most nearly allied to *D. grande*, Hook. f. It has the same thin-textured foliage and broad stem. The flowers have an unusually long mentum for a plant of this section, and look like those of some very small *Pedilonum*. Mr. Curtis describes them as dull yellow,—Dr. Keith, as having the petals and sepals purplish green, the lip greenish yellow with bright pink borders. The lip has a narrow linear base, and gradually widens upwards till it ends in a rounded bilobed blade, the margins of which are very obscurely toothed. There is no caruncle or callus on the lip, but the end is thickened and fleshier than the rest of the flower.

DENDROBIUM (§ APORUM) LEONIS, *Reichb. f. in Walp. Ann.*, vi. p. 280. *Aporum Leonis*, Lindl., Bot. Reg. (1840) Misc., p. 59.

A common plant, growing on trees low down in orchards, dry forests, and open places, flowering irregularly all the year. The leaves are dark, dull green. The flower, which is strongly scented of vanilla, is yellowish, thickly dotted with purple outside and cream colour or brownish within, the lip paler above, with a reddish central bar beneath, dotted with purple. It is usually more or less emarginate at the apex and ciliate. The column is rather short, yellowish, with an orange spot at the base. The anther is rather large, cap-shaped, truncate. The stigma very small. Pollinia oblong orange.

Hab. Singapore: Selitar! Toas! Tauglin! Pulau Tekong! (in Johore Strait.)
Johore: Batu Pahat!
Rhio: *Native collector!*
Malacca: Merliman! Sungei Bakru Ulu!
Selangor: Seppan!
Pahang: Kwala Pahang! Kota Glanggi!
Perak: *Scortechini.*
Kedah: Yan!
Cochin-China: Saigon, *Haffner!*

D. (§ APORUM) PROSTRATUM, *Ridl., sp. nova.* *Caules* c. pedales, procumbentes, ramosi, radicati. *Folia* $\frac{1}{4}$ poll. longa, ferme $\frac{1}{4}$ poll. lata, oblongo-triangularia, subacuta vel obtusa, carnoso-coriacea, rugosa, alro-viridia sæpe purpurascentia. *Flores* iis *D. Leonis* similes sed minores, pallide flavi haud raro rufo-tincti, sub expansione odori. *Sepalum* posticum ovatum obtusum, lateralia multo majora ovata subfalcata; mentum breve,

curvum, latum, obtusum. *Petala* sepalis breviora multo angustiora tenuiora pallidiora, spathulata. *Labellum* oblongum, apice dilatatum rotusum, marginibus erectis; carina basi elevata, apice attenuata aurantiaca a callo parvo oblongo vel quadrato erecto ornata.

Hab. Singapore: On trees in mangrove swamps, Kranji! Selitar! Sungei Blukang!
Selangor: Seppan!

This little species is allied to *D. Leonis*, Reichb. f., which it resembles in form of leaf and flower, but it is always prostrate in habit, the stems lying flat on the tree trunks, emitting roots from their under side, and branching. The flowers are much smaller than those of *D. Leonis*, and have a vanilla scent. The lip bears at its end in the broadest part a small almost cubical callus.

DENDROBIUM (§ STRONGYLE) TERES, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 51. *Caules* plures congesti, 10–15 poll. longi, graciles, rigidi. *Folia* plura, 3–4 poll. longa, $\frac{1}{8}$ poll. crassa, teretia, obtusa, atroviridia; vaginæ $1\frac{1}{4}$ poll. longæ, teretes, ore obliquo-integræ. *Flores* majusculi, singulatim expansi, e bractearum fasciculis, in apicibus caulium vetustorum (ob folia delapsa) nudis, exorti; pedicelli cum ovario $\frac{1}{2}$ poll. longi, virescentes. *Sepala* subæqualia, $\frac{1}{2}$ poll. longa, subpatula, lanceolata, acuta, alba; mentum ultra $\frac{1}{4}$ poll. longum, rectum, conicum, obtusum. *Petala* sepalis æquilonga, paullisper angustiora. *Labellum* sepalis brevius, 3-lobum, carinis in disco 3 (medio breviore) acutis rubro-flammeis ornatum; lobi laterales oblongo-ovati, subacuti, erecti, a nervis flammeis ornati, medius angustior lanceolatus acuminatus acutus. *Columna* fere recta, alba; venter excavatum, canaliculatum; clinandrium profundum; stelidia erecta, antheram haud superantia. *Anthera* conica, obtusa; loculi disjuncti; rostrum ovatum, integrum; rostellum integrum, decurvum, rotundatum. *Stigma* parvum, profundum, ovale, marginibus paullisper elevatis.

Hab. Singapore: on high trees, Toas!
Johore: Kota Tinggi!

I have little doubt as to the correctness of this identification, though I have not seen the type specimen. But, as Lindley's description does not, in some respects, fit my specimen, I have given a fresh description.

The plant is very stout and large for the section, with thick, terete, blunt leaves, very distant, on account of the long internodes. The flowers are of a thicker texture than most in the section, and last longer. They are pure white, except for the flame-coloured veins on the inner side of the lateral lobes of the lip and the three red keels in the middle. They have a scent of heliotrope. The lip is distinctly three-lobed, a rarity in the section, the mid-lobe being sharp and acute.

It is not a common plant.

DENDROBIUM (§ STRONGYLE) JUNCEUM, *Lindl.*, *Bot. Reg.* (1842) *Misc.*, p. 9.

Hab. Singapore: Hort. Loddiges.

I have met with nothing corresponding to this species in Singapore; but what I take to be the plant intended I received from Manilla, sent by Sr. Vidal. If I am correct in this, its affinity is with *D. crumenatum*, Sw., not with the section *Strongyle*, although the leaves are terete, or nearly so.

D. ACICULARE, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 81. Said to come from Singapore, but was doubtless erroneously located.

D. (§ STRONGYLE) ALBICOLOR, *Ridl.*, *sp. nova.* *Caules* usque ad 8 poll. longi, sœpe ramosi, basi ob folia delapsa nudi; internodi superne dilatati. *Folia* 1–1½ poll. longa, crassa, teretia, acuta, atro-viridia. *Flores* sæpe terminales, singuli, pro sectione maximi, albi; pedicelli ferme 1½ poll. longi, graciles. *Sepalum* posticum parvum oblongum obtusum, lateralia multo majora: mentum cum sepalis æquilongum, curvum, obtusum. *Petala* sepalis angustiora, lineari-oblonga. *Labellum* obcuneatum, emarginatum, album, apice flavo-tinctum; margines crispi; linea mediana elevata. *Columna* brevis; pes longus; stelidia erecta. *Anthera* ovoidea. *Stigma* rotundatum, ovatum.

Hab. Siam: Pungah, *Curtis!*

I had some fine plants of this in the Singapore Botanic Garden, which I believe came from Mr. G. Mann, in Assam, but their label was lost. It has the largest flowers in the section, nearly pure white, except a yellow tint on the lip and some pink spots on the column foot.

D. (§ STRONGYLE) KENTROPHYLLUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 725.

Hab. Perak: *Scortechini.*
Pahang: Tahan River Woods? (a fruiting specimen only.)

This seems most to resemble *D. acerosum*, Lindl., but the mentum is very narrow and acute.

DENDROBIUM (§ STRONGYLE) SUBULATUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 726.

Hab. Singapore: Bukit Timah! Bukit Mandai! Selitar!
Penang: Western Road, *C. Curtis!*
Rhio: *Native collector!*
Also Sumatra: Djambi!

A small tufted plant with semi-transparent whitish flowers veined with pink, the lip white with a central orange spot.

D. (§ STRONGYLE) ACEROSUM, *Lindl.*, *Bot. Reg.* (1841) *Misc.*, p. 43.

Hab. Singapore: Kranji! Common on trees and bushes.
Johore: Kwala Kahang, Kwala Sembrong, *Lake and Kelsall!* Tanah Runto!
Pahang: Kwala Pahang!
Penang: Near the town, *C. Curtis!*
Rhio!
Siam: Bangtaphan, *Dr. Keith!*

D. (§ STRONGYLE) FLEXILE, *Ridl.*, *sp. nova.* *Caules* plures, usque ad 3 poll. longi, tenues, gracillimi, flexuosi, penduli. *Folia* ¾ poll. longa, teretia, acuminata acuta, ad caulem adpressa. *Flores* subterminales, ½ poll. longi, penduli. *Sepalum* posticum parvum lanceolatum acutum, lateralia ovato-triangularia acuta; mentum multo majus, latum, obtusum, curvum. *Petala* parva, linearia, alba. *Labellum* album, maculâ in medio aurantiacâ; unguis linearis; lamina lata, obovato-rotundata, apice obscure 3-loba, in margine denticulata.

Hab. Singapore: Bukit Tinah!
Pulau Aor: East corner of Johore, *Feilding!*

The smallest plant of the section that I have seen, with flowers nearly as large as those of *D. subulatum*, Hook. f.

D. (§ VIRGATÆ) CONOSTALIX, *Reichb.*, *f.*, *in Walp. Ann.*, vi. p. 292. *D. calcaratum*, Lindl., Bot. Reg. (1840) Misc., p. 89.

Hab. Singapore: Changi! Bukit Mandai! Tampinis!
Malacca: Bukit Bruang!

This inconspicuous slender plant almost always grows in shallow water. It is called "*Rumput Raja*," Sari, in Malacca.

DENDROBIUM (§ VIRGATÆ) VILLOSULUM, *Wall. List*, n. 2006. *D. Lobbii*, Teysm. et Binn. in Tijdschr. Nederl. Ind., v. (1853) p. 491.

Hab. Singapore: Bajan, in dry woods! Toas! Kranji! Sungei Buloh!
Malacca: Mt. Ophir! Alt. 3,000 feet.
Penang: *Porter* (Wall. List, n. 2006).
Kedah: Kedah Peak! At 4,000 feet elevation.

I have little doubt but that Teysmann's *D. Lobbii* is the same as Wallich's plant, as there are specimens quite identical with the common species in Lobb's Herbarium (n. 482). It is always terrestrial, growing among dry leaves and in moss, and ascending to the tops of the mountains.

D. (§ VIRGATÆ) ABIETINUM, *Ridl.*, *sp. nova*. *Caules* plures, pedales, graciles; internodi inferiores longi, canaliculati, glabri. *Folia* remota, 4 poll. longa, $\frac{1}{8}$ poll. lata, acuta, canaliculata. *Flores* parvi, in racemo brevissimo bini; bracteæ parvæ, lanceolatæ, cum $\frac{1}{2}$ parte pedicelli æquilongæ. *Sepala* explanata, alba rufo-striata, oblonga obtusa, lateralia (postico latiora) $\frac{1}{4}$ poll. longa, $\frac{1}{8}$ poll. lata; mentum cum sepalis æquilongum. *Petala* anguste linearia, acuta, virescentia lineâ medianâ rufescente. *Labellum* carnosum, spathulatum, obscure 4-lobum; lobi laterales vix distincti, medius paullo longior emarginatus obtusus pallide viridis; carinæ in disco 2, paullo elevatæ. *Columna* angusta, fere recta, basi excavata, alba; stelidia recta dentiformia. *Anthera* oblonga, quadrata. *Stigma* magnum.

Hab. Kedah: Gunong Jerai! 4,000 feet alt.; Gunong Raya, *Curtis!*
Perak: Maxwell's Hill! 3,000 feet alt.

An ally of *D. pinifolia*, Ridl., but differing in its thinner glabrous stems, linear channelled leaves, much smaller flowers, and different lip. The base of the column is excavate, so as to form a nectary. It is epiphytic, growing on trees, at no great height from the ground in dense woods.

D. (§ BAMBUSIFOLIÆ) GEMELLUM, *Lindl.*, *Gen. et Sp. Orch.*, p. 81. Epiphytica, 2–3-pedalis. *Caules* erecti, basi teretes, superne compressi. *Folia* 4 poll. longa, $\frac{1}{3}$ poll. lata, lanceolata, lorata, tenuiter coriacea, graminea, striata, nec carinata nec canaliculata, apice obtusa inæqualiter biloba; vaginæ $\frac{3}{4}$ poll. longæ, transversim rugosæ, ore integræ. *Racemus* brevissimus,

in bracteis 2 oblongis obtusis celatus, biflorus, e medio internodi (folio oppositus) extrusus. *Flores* parvuli, flavescentes. *Bractea* floralis minuta, ovata; pedicellus $\frac{1}{2}$ poll. longus, gracilis; ovarium distinctum, $\frac{1}{8}$ poll. longum, crassiusculum. *Sepalum* posticum lanceolatum subobtusum, lateralia majora triangulari-lanceolata; mentum cum sepalis æquilonga, crassum, obtusum, curvum. *Petala* lineari-lanceolata, acuta, flavescentia vel virescentia. *Labellum* sepalis brevius, angustum, spathulatum, tenue, albescens, integrum; margines erecti; linea mediana paullo elevata. *Columna* brevis, crassa; clinandrium profundum; pes longiusculus. *Anthera* calvariiformis, minute verrucosula margine retuso; pollinia 4, æqualia, elliptica, parallela; stelidia brevissima, vix distinguenda; rostellum poculiforme, latum, crassum, integrum. *Stigma* magnum, oblongum, profundum, basi a callo conico bifido auctum.

Hab. Singapore: On mangroves!
Malacca: Bukit Bruang, *Griffith*, in herb. Lindley!
Also Java! Sumatra, Djambi! A broader-leaved form with larger, whiter flowers.

An unattractive plant, with greenish or yellowish fugacious flowers. It is often brought in by natives, and appears to be quite common among the Malay Islands.

Dendrobium (§ **Bambusifoliæ**) **pensile**, *Ridl.*, *sp. nova.* *Caules* plures, 2–3-pedales, penduli, congesti, per totam longitudinem foliati, teretes. *Folia* 3 poll. longa, $\frac{3}{4}$ poll. lata, disticha, subobtusa, læte virentia. *Racemi* brevissimi, e mediâ parte internodi orti; bractea ovato-triangularis, lata sicca. *Flores* bini, sessiles, flavi; ovaria $\frac{1}{2}$ poll. longa, crassa. *Sepala* lanceolata attenuata contorta, lateralia triangularia obtusa: mentum breve, latum, obtusum. *Petala* angusta, lanceolata. *Labellum* sepalis multo minus, trilobum; lobi laterales breves erecti curvi falcati, medius longior lanceolatus acutus pubescens apice recurvus flavus a lineâ medianâ rubrâ percursus. *Columna* crassa, subglobosa, superne attenuata; pes angustus. *Anthera* crassa, subglobosa. *Stigma* rotundatum.

Hab. Singapore: Selitar!
Johore: *Native collector!*
Rhio: *Native collector!*

A very curious plant with a large number of long, hanging stems, covered with thick fleshy leaves. The flowers have a

very thick conical ovary and no pedicel. They are produced in pairs subtended by a large dry bract. The lip is remarkably small and the globose column narrowed at the top is very singular.

It grows on mangrove trees overhanging the river.

DENDROBIUM (§ CLAVATÆ) TUBERIFERUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 728.

Hab. Singapore: Selitar! Toas!
Pahang: Kwala Pahang!
Perak: Gunong Hijan, *Murton*, fide *Hook. f.*, *l.c.*

On trees usually in the low country, local and never common.

D. (§ CLAVATÆ) CLAVIPES, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 728.

Hab. Pahang: Pulau Chengei!
Perak: *Scortechini.*

On trees in thick woods, low country.

I have also received this from Djambi, in Eastern Sumatra.

D. (§ CLAVATÆ) CRUMENATUM, *Sw. in Schrad. Journ.*, ii. (1799) p. 237.

Hab. Singapore: common everywhere on trees and rocks by the sea. Selangor! Negri Sembilau! Perak! Johore!
Malacca! Penang: Common everywhere in the low country!
Pahang: Pekan!
Kedah: Yan!
Siam: Bangtaphan, *Dr. Keith!*
Cochin-China: Saigon, *Dr. Haffner!*

This common plant, known to the residents as the Pigeon-orchid on account of the form of the unopened flower, has, like some other orchids here, the habit of flowering on particular days. At intervals of about nine weeks all the plants in a given district burst into flower on a certain day, and as the flowers are very conspicuous and abundant, it has a striking effect. They are all withered by the end of the day, and no more are seen till the next flowering day. Sometimes there are a few isolated plants which flower a few days or even weeks distant from the others, but far the greater number open on the same day. I observed that in Malacca on one occasion all the plants flowered on the day before those in Singapore, but

plants brought down to Singapore from as far north as Siam flowered simultaneously with those in Singapore.

The natives call it "*Bunga Angin*" (lit. Windflower) in Malacca, and boil the pseudo-bulbs and use them for earache.

DENDROBIUM (§ CLAVATÆ) INCONCINNUM, *Ridl., sp. nova. Radices* longæ, crassæ. *Caules* ultrapedales, basi pollicari teretes, dein pseudo-bulbosi 1½-pollicares fusiformes, superne graciles ramosi teretes. *Folia* dissita; vaginæ 1½ poll. longæ; laminæ 1¾ poll. longæ ¼ poll. latæ, apice obtusæ. *Racemi* ⅛ poll. longi, a bracteis siccis tecti, ex internodorum basibus extrusi. *Flores* 1 poll. longi, singulatim expansi, albi. *Sepalum* posticum lanceolatum acutum, lateralia multo majora ovata acuta falcata; mentum rectum, longius. *Petala* linearia, falcata. *Labellum* obcordatum, emarginatum; lobi laterales lati apice rotundati, medius suppressus. *Columna* lata, erecta; stelidia parva, erecta. *Stigma* oblongum, majusculum.

Hab. Siam: Pungah, on trees near the village, *C. Curtis!*

A very insignificant straggling plant, with the stem swollen into a pseudo-bulb an inch and a half above the base.

It appears to be most nearly allied to *D. crumenatum*, Sw.

D. (§ CLAVATÆ) CLAVATOR, *Ridl., sp. nova. Caules* ultrapedales, basi et apice nudi, superne graciles; internodi basales pauci, teretes, unus ¾ poll. longus incrassatus fusiformis 10-costatus olivaceus. *Folia* 3 poll. longa, $\frac{1}{16}$ poll. crassa, pauca, remota, teretia, acuta, canaliculata. *Racemi* breves, e caulis parte nudâ terminali orti; bracteæ plures bruneæ. *Flores* parvi, singulatim expansi, pallide flavescentes rubrotincti. *Sepalum* posticum ⅜ poll. longum lanceolatum acutum, lateralia $\frac{3}{16}$ poll. lata late ovata falcata; mentum latum, curvum, crassum. *Petala* ¼ poll. longa, lanceolata, sepalo postico breviora angustiora. *Labelli* lobi laterales oblongi rotundati pallidi rubronervosi, medius ovatus obtusus minute denticulatus; discus elevatus flavescenti-rubescens. *Columna* brevis, striato-rubescens. *Anthera* rotundato-oblonga, late marginata; stelidia obscura. *Stigma* rotundatum, viride.

Hab. Perak: Thaiping!

This species is allied to *D. clavipes*, Hook. f., but differs in the terete leaves grooved on the upper surface, and the denticulate mid-lobe of the lip.

DENDROBIUM (§ DISTICHOPHYLLÆ) REVOLUTUM, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 51; *Hook. f.*, *Bot. Mag.*, t. 6706.

Hab. Johore: Batu Pahat! *Native collector.*
Kedah: Kedah Peak! 3,000 feet alt. on low trees.
Moulmein: Parish.

Rather a local plant, but abundant in a few places. I have never seen it in Singapore.

D. (§ DISTICHOPHYLLÆ) UNIFLORUM, *Griff.*, *Notul.*, iii. p. 305, *Ic. Pl. As.*, t. 303.

Hab. Malacca: Mount Ophir! (all collectors); on low trees at 2,000-3,000 feet alt.
Perak: Maxwell's Hill!.

I have already (in Trans. Linn. Soc., Ser. II. Bot. iii. p. 363) described this species so as to show its distinctness from the preceding, with which it has been confused.

Lindley's specimens on which he based *D. revolutum* were a mixture of this species and the last. His plants were received from Mr. Barker, of Birmingham (specimen not extant), from Messrs. Loddiges; specimen in herb. Lindley is *D. revolutum*, specimen from "Singapore, Cuming," is *D. uniflorum*, Griff., and doubtless came from Mount Ophir, where Cuming had already collected other orchids.

D. (§ DISTICHOPHYLLÆ) METACHILINUM, *Reichb. f. in Bonplandia*, iii. (1855) p. 222.

Hab. Malacca: On the tops of lofty trees, *R. Derry!* Also collected by Cuming and Maingay.

This appears to be a rare plant, but perhaps its habitat makes it difficult to obtain. Its flowers are described as "chrome yellow," but this is not the case in the living plants I have flowered in Singapore. They were of a bright raw sienna colour.

D. (§ DISTICHOPHYLLÆ) BIFARIUM, *Lindl. in Wall. List*, n. 2002. *D. excisum*, Lindl., Bot. Reg. (1841) Misc., p. 77.

Hab. Singapore: Tanglin! Toas! Chan Chu Kang! Sirangoon! Often on roadside trees.
Penang: *Wallich.*

The commonest species of the section, with small primrose yellow flowers. The description of the lip as having "7-9 close set ridges" only applies to dried specimens. In a living state the lip is covered with a pulverulence arranged more or less in lines, with a median channel down the centre. The capsule is an inch in length and half an inch thick, pear-shaped and oblique.

DENDROBIUM (§ DISTICHOPHYLLÆ) PANDANETI, *Ridl.*, *sp. nova.* *Caules* elongati, ramosi; rami 8-12 poll. longi; radices paucæ. *Folia* 3 poll. longa, $\frac{3}{4}$ poll lata, oblanceolata acuminata inæqualiter biloba, tenuia, herbacea, pallide flavo-viridia; vaginæ subteretes, carinatæ, virides, ore integro $\frac{3}{4}$ poll. lato. *Racemi* $\frac{1}{4}$ poll. longi, axillares, pauciflori; bracteæ minutæ ovatæ virides; pedicelli cum ovariis 1 poll. longi, albi. *Flores* patentes, iis *D. metachilini* æquales. *Sepalum* posticum $\frac{1}{2}$ poll. longum $\frac{1}{4}$ poll. latum, lanceolatum, acutum, lateralia similia; mentum curvum, obtusum, gracile sepalo minus. *Petala* linearia, acuta; sepala petala (menti dorso cervino excepto) alba. *Labellum* basi angustatum lineare; lobi laterales breves, obtusi, incurvi, medius cordatus obtusus carnosulus rubro-aurantiacus marginibus convolutis appressis; carinæ in disco 3, æquales, aurantiacæ. *Columna* recta, olivaceo-brunea, in ventre canaliculata; stelidia ovata, incurva, stigma partim integentia. *Anthera* immersa, brunea. *Capsula* 1 poll. longa, cervina (nunquam viridis); costæ fertiles sterilibus bis latiores, canaliculi profundi inter costas siti.

Hab. Singapore: Bukit Mandai! (n. 5029), on *Pandanus atrocarpus*, Griff.
Johore: Pulau Kukub, on Sago Palms. Also in similar localities at Tanjong Kopang, on the Johore Strait.

I believe the affinity of this plant is with *D. revolutum*, Lindl., although the vegetative organs are very different from any in the section *Distichophyllæ*. The stems are long, weak, and branching, emitting slender roots at intervals by which it scrambles up the vertical stems of Sago-palms, *Pandani*, &c. The leaves are long and thin, and very unequally bilobed at the apex. The racemes are axillary and few-flowered. The flowers are inconspicuous, almost entirely white, except that the back of the spur, three lines on the lip, and the whole of the terminal lobe of the lip are dull orange. The capsule is curious from its being apparently never green, but from its earliest stage is of a light fawn colour.

DENDROBIUM (§ DISTICHOPHYLLÆ) HOSEI, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 363.

Hab. Pahang: Tahan River Woods!

D. (§ BREVIFLORÆ) CALLIBOTRYS, *Ridl.*, *sp. nova.* *Caules* plures, 6 poll. longi, 1¼ poll. crassi, subteretes, sulcati, haud incrassati; internodi 1¼ poll. longi. *Folia* pauca, in apice caulis sita, 4 poll. longa 1 poll. lata, lanceolata, tenuiter coriacea; nervi 6, distincti; carina acuta, non multum elevata. *Racemi* 1 poll. longi, caulium apices versus siti, 6-flori. *Flores* mediocres, congesti, carnosi, odorati, vix expansi; pedicelli ¼ poll longi; bracteæ perlatæ, ovatæ acutæ, tenues herbaceæ, persistentes, bruneo-striatæ. *Sepalum* posticum ½ poll. longum ¼ poll. latum, late ovatum obtusum, lateralia longiora ovata acuta falcatula; mentum sepalis multo brevius, crassum. *Petala* lanceolata, falcata, sepalo postico longiora; sepala petala alba. *Labellum* obovatum cuneatum, cochleatum, carnosum, apice crassius flavum, basi album a striis purpureis ornatum. *Columna* ferme recta, alba, ventre plana, basi excavata. *Anthera* apice rotundata, alba; pollinia anguste linearia; rostellum breve bilobum, lobis rotundatis. *Stigma* majusculum, semicirculare, in margine elevatum. *Capsula* 1½ poll. longa, oblonga; pedicelli pedunculusque elongati incrassati.

Hab. Singapore: Toas, Sungei Mora!

Very local on tree trunks. It is a pretty species with sweetly-scented flowers. The peduncle and pedicels elongate in fruiting, and the large capsule splits up into its separate ribs when dehiscing. I should have taken this plant for *D. breviflorum*, Lindl., in Journ. Linn. Soc. (Bot.) iii. (1859) p. 14; but Sir J. D. Hooker refers this to *D. bicameratum*, Lindl. Lindley's description is rather incomplete.

D. (§ BREVIFLORÆ) HERCOGLOSSUM, *Reichb. f. in Hamb. Gartenz.*, xlii. (1886) p. 558; *Gard. Chron.* (1886) II. p. 487. *D. aduncum*, Hook. f., Bot. Mag., t. 6784.

Hab. Pulau Tioman: an island off the east coast of Johore, *W. Nanson* v.v.!

D. (§ BREVIFLORÆ) EUPHLEBIUM, *Reichb. f. ex Lindl. in Journ. Linn. Soc.* (*Bot.*) iii. (1859) p. 7, *Xenia Orch.*, ii. p. 26. t. 110.

Hab. Singapore: In mangrove swamps, Kranji. Selitar and Toas!

This also occurs in Borneo and Java. It is omitted from the Flora of British India, but is not rare in Singapore.

DENDROBIUM (§ BREVIFLORÆ) FLAVIDULUM, *Ridl. ex Hook. f.*, *Fl. Brit. Ind.*, vi. p. 185.

Hab. Singapore: Kranji! Jurong! In mangrove swamps. Rhio.

D. (§ BREVIFLORÆ) VIRIDULUM, *Ridl.*, *sp. nova.* *Caules* pedales, graciles, flexuosi, basi dilatati incrassati, superne $\frac{1}{8}$ poll. crassi teretes; internodi 1 poll. longi. *Folia* 3 poll. longa, $\frac{3}{4}$ poll. lata, lanceolata acuminata acuta, flaccida, inæqualiter biloba, lobus alter altero $\frac{1}{4}$ poll. longior. *Flores* parvi, iis *D. flaviduli* æquales, virides, bini in caulibus defoliatis, in pedunculo brevissimo siti; ovaria cum pedicellis $\frac{3}{4}$ poll. longa. *Sepala* lanceolata, acuta; mentum brevissimum, crassum, obtusissimum. *Petala* sepalis latiora, tenuiora, pallidiora. *Labellum* cum sepalis æquilongum, oblongum, cuspidatum; discus crassior; margines tenuiores minute denticulati, pubescentes. *Columna* brevis, lata; stelidia brevia, obtusa.

Hab. Siam: Pungah, *Curtis!*

Near *D. flavidulum*, Ridl., but weaker and more slender; sepals and petals narrower, longer in proportion.

D. (§ PEDILONUM) SECUNDUM, *Lindl. in Bot. Reg.*, t. 1291; *Wall. List*, n. 1996.

Hab. Long Island, south of Singapore, *W. Nanson!*
Johore: Common on the East Coast.
Pahang: Kwantan!, Kwala Pahang!
Penang: *Wallich.*

This species occurs also in Tenasserim and Cochin-China, Sumatra, Java, and Borneo.

It does not seem to be at all common in the Malay Peninsula. I have only gathered it myself on low trees in open country in Pahang.

D. (§ PEDILONUM) VIRESCENS, *Ridl.*, *sp. nova.* *Caules* ultrapedales, graciles, teretes, sæpe flexuosi. *Folia* 4 poll. longa, 1 poll. lata, lanceolata acuminata, tenuia, apice admodum inæqualia. *Racemi* e caulibus nudis orti, laxi, usque ad 12-flori; bracteæ breves, lanceolatæ, cuspidatæ; pedicelli 1 poll.

longi, graciles, patentes. *Flores* pedicellis longiores. *Sepalum* posticum $\frac{1}{4}$ poll. longum, ovatum acutum, lateralia paullo latiora; mentum $\frac{3}{4}$ poll. longum, pendulum, cylindricum, clavatum. *Petala* sepalis breviora, late ovata. *Labellum* longe anguste unguiculatum, apice dilatatum, margines incrassati; lamina transversa carnosa, apice tenuiter rotundata apiculata, margo denticulatus. *Columna* lata; clinandrium profundum; margines elevati; stelidia tenuia, lata. *Anthera* pileata, apice conica; caudicula longa; clinandrii margo elevatus; rostellum latum obtusum. *Stigma* profundum; columnæ margines multum elevati.

Hab. Legeh: Tomoh, *A. Machado!* v.s.

A curious species, allied to *D. brievianum*, Rolfe, with greenish-yellow flowers. The lip has a very narrow linear base, adnate to the mentum, enlarging gradually towards the apex till near the end, where the margins are thickened and fleshy, and a fleshy transverse bar connects them. The epichil is deflexed, it is quite thin and rounded when spread out, and denticulate. The sides of the column above the very slender foot are raised into fleshy wings. The anther is remarkable for being attached by the very apex to an unusually long filament, which takes its rise from the base of a triangular process of the clinandrium margin, such as one generally considers to be the filament itself.

DENDROBIUM (§ PEDILONUM) ÆGLE, *Ridl., sp. nova.* *Caules* usque ad 2 ped. longi, $\frac{1}{8}$ poll. crassi, canaliculati. *Folia* 3 poll. longa $\frac{3}{4}$ poll. lata, lanceolata subacuta, coriacea. *Racemi* $\frac{1}{4}$ poll. longi, e caulibus defoliatis orti; bracteæ breves, lanceolatæ acutæ; pedicelli cum ovario $\frac{1}{2}$ poll. longi, filiformes. *Flores* plures, læte rosei. *Sepalum* posticum $\frac{1}{4}$ poll. longum oblongum obtusum, lateralia lanceolato-ovata subobtusa curva; mentum $\frac{1}{4}$ poll. longum, teres, obtusum, in medio flexum. *Petala* sepalis breviora latiora tenuiora, obtusa. *Labellum* spathulatum, basi anguste lineare; lamina obovata, in margine laciniata; callus nullus. *Columna* brevis. *Anthera* hemisphærica; caudiculus longus; stelidia erecta, triangularia.

Hab. Perak: Maxwell's Hill, Larut Hills!

This much resembles *D. cornutum*, Hook. f., but has smaller flowers, with the edge of the lip lacerate. The flowers are of a beautiful mauve colour. It grows sometimes very high up on the trees in the jungle at Maxwell's Hill. The description is mainly from dried specimens.

DENDROBIUM (§ PEDILONUM) ROSEATUM, *Ridl., sp. nova.* *Caules* ultra 2 ped. longi, graciles, sulcati. *Folia* 3 poll. longa, $\frac{1}{2}$ poll. lata, lanceolata acuta. *Racemi* 1 poll. longi, usque ad 6-flori; bracteæ $\frac{1}{16}$ poll. longæ, ovatæ, persistentes; pedicelli 1 poll. longi, graciles. *Flores* magni. *Sepala* $\frac{1}{2}$ poll. longa, ovata; mentum cum sepalis æquilongum, basi rectum, apice clavatum curvum. *Petala* sepalis latiora, late ovata obtusa. *Labellum* spathulatum, basi anguste lineare; margines involuti; lamina late rotundata, crenulata; sepala petala alba roseo-tincta. *Columna* brevis, crassa; pes angustus; stelidia brevia, lata, rotundata incurva; clinandrium profundum, marginibus productis. *Anthera* lata, calvariiformis.

Hab. Perak: Maxwell's Hill, *C. Curtis!* v.s.

This is evidently very near *D. megaceras*, Hook. f., which, however, has a three-lobed lip, a long, curved mentum not dilated before the tip, and petals smaller than the sepals.

D. (§ PEDILONUM) PYROPUM, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893), p. 362.

Hab. Pahang: Tahan Woods! Sungei Ujong, *Dr. Braddon!*
Singapore: Choa Chu Kang (1894).

I have had a single plant from each of these localties.

D. (§ PEDILONUM) CROCATUM, *Hook. f., Fl. Brit. Ind.*, vi. p. 185.

Hab. Perak: Larut (*King's Collector*).

Resembles apparently the preceding, but has a crenulate lip and an oblong reversed callus at the base.

D. (§ PEDILONUM) KENTROCHILUM, *Hook. f., Fl. Brit. Ind.*, v. p. 731, *et Ic. Pl.*, t. 2030.

Hab. Perak: Batang Padang Valley, *Wray.*

D. MEGACERAS, *Hook. f., Fl. Brit. Ind.*, v. p. 731.

Hab. Malacca, *Maingay.*

D. (§ PEDILONUM) EOUM, *Ridl., sp. nova.* *Caulis* 2 ped. longus, $\frac{1}{8}$ poll. crassus, canaliculatus, purpurascens; internodi 1 poll. longi. *Folia* non visa. *Racemus* $\frac{1}{4}$ poll. longus, 2-florus; bracteæ minutæ, ovatæ. *Flores* magni, rosei; pedicelli $\frac{3}{4}$ poll. longi. *Sepalum* posticum $\frac{1}{2}$ poll. longum $\frac{1}{4}$ poll. latum, oblongo-ovatum obtusum roseum, lateralia majora oblonga obliqua pallidiora; mentum $\frac{3}{4}$ poll. longum, angustum, complanatum, apice dilatatum uncatum subacutum. *Petala* sepalis multo longiora latiora, obovata obtusa. *Labellum* cum petalis æquilongum, $\frac{1}{2}$ poll. latum, basi angustum canaliculatum, dente brevi acuminato retrorso addito; lamina oblonga, alba violaceo-punctata, apice dilatata emarginata minus violaceo-punctata; discus a lineis 3 punctorum violaceorum percursus. *Columna* superne multum incrassata; pes longus canaliculatus; stelidia brevia, erecta. *Stigma* profundum; margines multum incrassati.

Hab. Siam: Kopah, *Curtis!* (1894) v.v.

A very charming species of the *Pedilonum* section with large rosy flowers, the petals a good deal larger than the sepals, the mentum long and narrow, dilated towards the apex, which is then narrow and decurved. The lip has a broad spade-shaped blade with a terminal notch. It bears a short white retrorse tooth in the lower part of the narrow claw. The whole flower is rosy, deeper coloured at the apex of the petals and mentum, which has a reddish tint. The lip is white with three lines of violet dots and other dots scattered over it; the apex is also violet-mauve.

DENDROBIUM (§ PEDILONUM) LAMELLATUM, *Lindl., Gen. et Sp. Orch.*, p. 89.

Hab. Singapore: Changi! In damp, swampy woods on tree stems.
Selangor: Kwala Lumpur!
Pahang: Kwantan!
Perak: *Scortechini.*

Not a very rare plant, though certainly local. It is very widely distributed, occurring from Tenasserim to Java. The stems are remarkably thin for their height and breadth.

The flowers open white but soon turn ochreous yellow, as figured in the 'Botanical Register' (1844), t. 53. It seems to me this should be placed with *Pedilonum* rather than with *Eudendrobium.*

D. (§ PEDILONUM) SANGUINOLENTUM, *Lindl., Bot. Reg.* (1842) *Misc.*, p. 62.

Hab. Penang Hill: on trees in the Cypripedium Valley, 2,000 feet alt.
Kedah: Kedah Peak! alt. 3,000 feet, abundant on low trees and stumps.

It also occurs in Borneo! and the Tembelan Isles!

There are two forms of this: the true *D. sanguinolentun*, Lindl., with light, creamy yellow petals and sepals and lip tipped with violet pink, and an ochreous-yellow spot (not *red*, as usually described) in the centre of the lip; and var. *cerinum*, with no spots on the tips of the petals and sepals. *D. cerinum*, Reichb. f. in Gard. Chron. (1879) II. p. 554, collected in the Sulu Archipelago by Burbidge, seems to me to be hardly distinct from the latter variety, but, according to Burbidge's drawing and Reichenbach's description, the lip is obscurely three-lobed. I doubt its being a distinct species. The yellow variety was much more common in Kedah Peak than the violet-tipped one.

DENDROBIUM HYMENANTHUM, *Hook. f., Fl. Brit. Ind.*, v. p. 732. *D. hymenopterum*, Hook. f., Ic. Pl., t. 2032.

Hab. Perak: Gunong Batu Putih, *Wray*.

D. HUGHII, *Reichb. f. in Gard. Chron.* (1882), I. p. 764. *Caules* pedales vel ultra, teretes vel superne incrassati, graciles, debiles, purpurei; internodi breviores. *Folia* pauca, 3 poll. longa ¼ poll. lata, linearia, acuminata. *Flores* majusculi, 1½ poll. lati, caulium nudorum apices versus siti, singuli explanati, tenues, speciosi. *Sepala* elliptica, obtusa, alba sæpe pallide violaceo-tincta; mentum cum sepalo vix æquilongum, elongatum, rectum, gracile, acuminatum. *Petala* sepalis paullo majora, alba. *Labellum* integrum, spathulatum, apice lato truncatum, album (basi nervisque citrinis exceptis); carinæ 2, in labelli ungue connatæ, in laminâ divaricatæ; nervi in laminæ disco 2, elevati, paralleli. *Columna* brevis; pes longus; venter profunde canaliculatum, apice incrassatum, margines incrassati antheram subquadratam superantes; rostellum latum, retusum. *Stigma* magnum, rotundatum.

Hab. Kedah Peak: alt. 3–4,000 feet, on small trees!

A pretty species, with fairly large thin, white flowers, more or less tinted with violet, except on the backs of the sepals. The lip has two ridges on the claw, which separate on the blade, and their edges meet in the middle line, so as to form a nectary or tube on the claw, and there are also two thickened nerves on the mid-line of the blade with a channel between.

The column is greenish-white, with the upper part orange. It is evidently allied to the preceding species.

Mr. Boxall, who introduced this species, tells me he obtained it at Kedah Peak, and that this is the plant described by Reichenbach under the name of *D. Hughii*. The description is not a good one, and the locality is incorrect.

The section (§ *Speciosæ*) hardly occurs in the Malay Peninsula, though it is well represented in Siam.

DENDROBIUM CRUENTUM, *Reichb. f. in Gard. Chron.* (1884) I. p. 604.

Hab. Siam: near Toukah, local, *C. Curtis!*

The figure of this remarkable plant in Warner and Williams's Orchid Album, iv. t. 174, does not quite resemble the plants cultivated here in colour. The Siamese specimens had yellow flowers tinted only with green, not the bright apple-green of the figure, and the markings are cinnabar-red.

D. FARMERII, *Paxt., Mag. Bot.*, xv. (1849) p. 241.

Hab. Siam: Punga, rare, *Curtis.*

D. LITUIFLORUM, *Lindl. in Gard. Chron.* (1856) p. 372—was sent from Chantaboon, in Siam, by Dr. Keith.

D. AGGREGATUM, *Roxb., Hort. Beng.*, p. 63, *Fl. Ind.*, iii. p. 477.

Hab. Siam: Chantaboon, *Dr. Keith!* Pungah, *Curtis.*
Perak: *Scortechini.*

There is a figure of this in Scortechini's drawings, but no locality is given, and I have no other evidence of its being wild in Perak.

D. (§ SPECIOSÆ) DALHOUSIEANUM, *Wall. ex. Paxt., Mag. Bot.*, xi. (1844) p. 145.

Hab. Singapore: Chan Chu Kang! (1890).

Of this species, not hitherto known south of Tenasserim, I obtained a single large plant on a big fallen Dipterocarpous tree in dense forests at Chan Chu Kang. On the same tree was another orchid not known from the Malay Peninsula hitherto, viz., *Saccolabium giganteum*, Lindl., in fine flower. Both were indisputably wild, but I have never seen or heard of plants of either species occurring in the peninsula since.

D. SCORTECHINI, *Hook. f., Fl. Brit. Ind.*, v. p. 741.

Hab. Perak: *Scortechini.*

This I cannot distinguish from *D. superbum*, Reichb. f. Possibly the specimen and drawing were from cultivated plants of this species, which is often to be found in gardens in Singapore, being imported from Borneo.

BULBOPHYLLUM, Thou.

B. (§ SESTOCHILOS) MACRANTHUM, *Lindl., Bot. Reg.* (1844) t. 13.

Hab. Singapore: Common. Tanglin! Chan Chu Kang! &c.
Malacca!
Pahang: Pekan Woods!

B. MEGALANTHUM, *Griff., Notul.*, iii. p. 286, *et Ic. Pl. As.*, t. 292.

Hab. Malacca: Pulau Besar, *Griffith.*

I have sought for this on Pulau Besar, but can find nothing like it.

B. PATENS, *King. ex Hook. f., Fl. Brit. Ind.*, vi. p. 187.

Hab. Singapore: Chan Chu Kang! &c.
Johore: Tana Runto!

The foliage and pseudo-bulbs of this so closely resemble those of *B. macranthum*, Lindl., that it is very difficult to distinguish the two apart unless in flower. The flowers are smaller than those of typical *B. macranthum*, and, like them, have a scent of cloves.

B. (§ SESTOCHILOS) SANGUINEO-MACULATUM, *Ridl., sp. nova. Rhizoma* gracile; radices copiosæ, congestæ. *Pseudo-bulbi* 1½ poll. longi, ¼ poll. crassi, subteretes, curvi. *Folium* 4 poll. longum, 1 poll. latum, lanceolatum acutum, tenuiter coriaceum, læte virens, reticulatum; carina basi crassa superne attenuata, canaliculata. *Flos* singulus, majusculus, speciosus; scapus 2 poll. longus, a vaginis pluribus ampliatis tenuibus tectus; bractea ovario multo brevior. *Ovarium* acute carinatum, viride rubro-maculatum. *Sepalum* posticum 1 poll. longum, ½ poll. latum lanceolatum acutum carnosum, lateralia 1¼ poll. longa, semi-ovalia elliptica, basi depressa, libera. *Petala* lanceolata acuta, basi angustata; sepala petala flavescenti-viridia, translucentia, rubro-maculata. *Labellum* breve, parvum, crassum,

carnosum, stipitatum, curvum, basi latum; lobi laterales distincti denticulati, medius canaliculatus, flavus rubro-maculatus, apice et in canaliculo præsertim papillosus; papilli canaliculusque atro-kermesini. *Columna* brevis, crassa, flava rubro-punctata; dorsum rotundatum; apex liber; pes longus. Anthera depressa, obtusa, rubra, margine recto; stelidia bidentata, dens posticus, erectus acutus, anticus porrectus curvus. *Stigma* grande, rotundatum. *Capsula* 1½ poll. longa, viridis purpureo-maculata; costæ æquales.

Hab. Selangor: Kwala Lumpur, in woods, *C. Curtis!* v.v.

BULBOPHYLLUM (§ SESTOCHILOS) RUGOSUM, *Ridl.*, *sp. nova. Rhizoma* gracile, ramosum. *Pseudo-bulbi* plures, 2 poll. longi, ½ poll. lati, aggregati, cylindrici, rugosi, virides. *Folium* 6 poll. longum, 1½ poll. latum, petiolatum, oblanceolatum acutum, carinatum, submembranaceum. *Scapus* ½ poll. longus, pseudobulbo approximatus; bracteæ paucæ, ovato-lanceolatæ; pedicellus cum ovario 1 poll. longus. *Flos* ½ poll. in diam., vix apertus. *Sepala* 1 poll. longa, lanceolata acuta, pallide flava, extus multi-rugosa, lateralia sub labello approximata. *Petala* sepales breviora, albo-flavescentia. *Labellum* ¼ poll. longum, crassum, breviter stipitatum, carnosum, oblongum, apice decurvum, basi excavatum, in medio anguste canaliculatum, rufescens. *Columna* brevis, crassa, fusca; pes longiusculus; stelidia obtusa, triangularia. Anthera conica; margo retusus. *Ovarii* costæ carinatæ, sinuatæ.

Hab. Singapore: Chan Chu Kang! (Fl. July and September) v.v.

This plant forms a tuft of pseudo-bulbs, tolerably close together and cylindric in shape, barely larger at the base than at the apex. The flowers, of which each plant usually produces a number at once, are dull and inconspicuous. They are of a putty-yellow, curiously ribbed on the outside. The lip is small, broad, and thick, the apex decurved and the sides also deflexed; it is fleshy and squared in outline, in colour of a dull pinkish red. The ovary ribs are elevated into sharp, waved keels.

B. (§ SESTOCHILOS) PILEATUM, *Lindl.*, *Bot. Reg.* (1844) *Misc.*, p. 73.

Hab. Singapore: Selitar!
Penang: *Maingay*, *Curtis!*
Perak: *Wray.*

To the description in the 'Flora of British India,' I would add that the rhizome is rather slender, and the pseudo-bulbs, which are conic and about an inch long, are more than an inch apart. The flowers are widely open, all ochreous yellow, except that on the lip on each side of the groove at the base is a bar of red spots. The lip much resembles that of *B. patens*, King, in form. I see no "mesial ridges"; but there is a deep channel from the base of the lip for rather less than half its length. The column is greenish, rather longer than usual, and there are no distinct stelidia. The anther is conical and stands well above the clinandrium; it is green with a purple edge; the front margin is prolonged and emarginate.

BULBOPHYLLUM (§ SESTOCHILOS) REINWARDTII, *Reichb. f., in Walp. Ann.*, vi. p. 246.

Hab. Perak: *Wray*, &c.

B. (§ SESTOCHILOS) GALBINUM, *Ridl., sp. nova. Rhizoma* longe repens. *Pseudo-bulbi* 3 poll. longi, ¼ poll. crassi, cylindrici, costati, inter se 1–3 poll. dissiti. *Folium* petiolatum, ellipticum, acutum, tenuiter coriaceum; petiolus 1 poll. longus, canaliculatus; lamina 6 poll. longa, 1½ poll. lata, striata. *Pedunculi* 3 poll. longi, pseudo-bulbis approximati, graciles, 2-flori. *Flores* magni, speciosi, explanati; bracteæ ¼ poll. longæ, ovatæ acutæ; ovarium cum pedicello 3 poll. longum. *Sepalum* posticum 1½ poll. longum, lanceolatum acuminatum acutum, lateralia 1½ poll. longa, ⅝ poll. lata ovata acuminata. *Petala* ferme 1 poll. longa, ovata acuminata; sepala petala olivaceo-flava. *Labellum* cordatum, acuminatum, carnosum, stipitatum, basi profunde excavatum kermesinum subtus pro parte album, apice recurvatum. *Columna* lata; stelidia brevia, angulata, subobtusa; pes ⅜ poll. longus, linearis. *Anthera* distincte 2-locularis, subtriloba, apice rotundata; pollinia excavata. *Stigma* oblongum, basi rotundatum profundum.

Hab. Perak: Maxwell's Hill, climbing on trees, in dense jungle abundant!

This is a fine species, though the sepals and petals are of rather a dirty olive yellow. I should have taken it for *B. Reinwardtii*, Reichb. f., if that had not been described as having the lip not stipitate. There is a sketch of *B. galbinum* among Scortechini's drawings. The anther is nearly 3-lobed, the mid-lobe (crest) taller than the others, which are the loculi. The

rostellum is orange and sticky. The lip moves very readily on its stipes.

BULBOPHYLLUM (§ SESTOCHILOS) LONGIFLORUM, *Ridl.*, *sp. nova. Rhizoma* $\frac{1}{8}$ poll. crassum, longe repens, lignosum; radices plures, validæ. *Pseudo-bulbi* $1\frac{1}{4}$–$1\frac{1}{2}$ poll. longi, cylindrici, inter se 2 poll. dissiti. *Folium* 6–7 poll. longum, 2–$2\frac{1}{2}$ poll. latum, petiolatum, lanceolatum sæpius obovatum vel ellipticum, acutum, subcoriaceum in sicco membranaceum; petiolus 1 poll. longus; nervi plurimi, reticulati. *Scapus* 1 poll. longus, pseudo-bulbo sæpius approximatus, a bracteis lanceolatis acuminatis membranaceis tectus; pedicellus $1\frac{1}{2}$ poll. longi, basi a bracteâ longâ involutus. *Flos* 2 poll. longus, tenuis, haud explanatus. *Sepala* lanceolata, caudata, lateralia postico paullo latiora $\frac{3}{8}$ poll. lata. *Petala* $1\frac{1}{2}$ poll. longa, lineari-lanceolata, caudata, sepalis breviora angustiora. *Sepala* petala rosea, obscurius striata. *Labellum* $\frac{1}{4}$ poll. longum, crassum, curvum, breviter stipitatum, a latere visum reniforme, pallide aurantiacum, apice papillosum. *Columna* brevis; stelidia longa, porrecta, subteretia. *Ovarii* costæ, sinuatæ, elevatæ.

Hab. Kedah: Kedah Peak! alt. 3,000 feet, on trees and on the ground, abundant. v.v.
Penang: Government Hill, *C. Curtis!*

This belongs to the group with a stipitate broad thick fleshy lip, almost cubic in proportions, like that of *B. insigne*, Ridl.

The flowers are thin in texture and of a dull pink with darker veins, with an apricot-orange lip. The Penang specimens are rather smaller than those from Kedah, but appear to belong to the same species.

B. (§ SESTOCHILOS) HISPIDUM, *Ridl.*, *sp. nova. Rhizoma* validum, lignosum, longe repens; radices longæ, rigidæ. *Pseudo-bulbi* 1 poll. longi, conici, crassi, inter se usque ad 3 poll. dissiti. *Folium* lanceolatum, obtusum, coriaceum, in sicco nigricans, striatum, politum; petiolus 1 poll. longus; lamina 3–6 poll. longa, 2 poll. lata. *Scapi* $\frac{1}{2}$ poll. longi, pseudobulbis approximati, crassi, a bracteis undique tecti. *Racemus* $\frac{1}{2}$ poll. longus; rhachis crassa; bracteæ $\frac{1}{4}$ poll. longæ, ovatæ, acutæ. *Flores* majusculi, patentes, atropurpurei, fœtidi, usque ad 8 in racemo congesti. *Sepala* æqualia, $\frac{1}{2}$ poll. longa, $\frac{3}{8}$ poll. lata, ovata subacuta, polita, atrorubra in marginibus hispida, lateralia connata. *Petala* $\frac{1}{4}$ poll. longa, lanceolata, falcata,

rubra bruneo-striata, in marginibus hispida. *Labellum* crassum, sessile; unguis crassus, brevis; lamina linguæformis, lata, obtusa, verruculosa, basi a processubus 2 uncatis aucta; carinæ 2 humiles; canaliculus medianus. *Columna* longiuscula, pallida rubro-maculata; pes brevior; stelidia parva, erectia, dentiformia. *Anthera* conica, obtusa, flava rubro-punctata. *Stigma* scutiforme.

Hab. Kedah: Kedah Peak, alt. 4,000 feet. v.v.

I found this singular orchid growing in a dense dark wood of low trees on the summit of Kedah Peak, scrambling along the branches. The flowers form so compact a raceme that they look as if they were capitate. They are of a very deep red with long hairs on the edges of the sepals and petals, and are polished on the inner face. They exhale a strong odour of carrion. The lateral sepals are connate at the base and beyond the column foot. The species is most nearly allied to *B. Dayanum*, Reichb. f., differing in the long rhizome and distant pseudo-bulbs, the more numerous differently-coloured flowers, the connate sepals, &c. Except in size of flower neither this nor *B. Dayanum*, Reichb. f., has any clear relationship with the true *Sestochili*, but it is difficult to see where else to class them.

BULBOPHYLLUM (§ SESTOCHILOS) MEMBRANIFOLIUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 756.

Hab. Perak: Gunong Batu Putih, *Wray.*

B. *Sectio nova.* MONANTHAPARVA.

There are a number of one-flowered *Bulbophylla*, of very small size which differ so much from typical *Sestochili* that one can hardly class them in that group. They include:—

B. STRIATELLUM, *Ridl. in Ann. Bot.*, iv. (1890) p. 335.

B. VITTATUM, *Teysm. and Binn. in Tijdschr. Nederl. Ind.*, xxiv. (1862) p. 308; *Miq.*, *Choix des Plantes*, t. 20. f. 2.

B. OCULATUM, *Teysm. and Binn.*, *l.c.*, p. 309; *Miq.*, *l.c.*, t. xxii. f. 2.

B. MONILIFORME, *Par. and Reichb. f. in Trans. Linn. Soc.*, xxx. (1874) p. 151.

B. CATENARIUM, *Ridl.* (vide p. 270).

B. AVICELLA, *Ridl.* (vide p. 270).

BULBOPHYLLUM CORIACEUM, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iv. (1894) p. 235.

B. STRIATELLUM, *Ridl. in Ann. Bot.*, iv. (1890) p. 335 t. 22, fig. 7–9.

Hab. Singapore: Chan Chu Kang!

The stelidia in the drawing of the above-mentioned figure having been shown a little more slender than they should be has led Sir Joseph Hooker to imagine (Fl. Brit. Ind., vi. p. 189) that there was some confusion in the description and drawing. However, both were taken from the then only specimen I had seen. It is not very scarce in this locality, but one very rarely can get flowers.

B. CATENARIUM, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iv. (1894) p. 235.

Hab. Singapore: Sungei Buloh! On mangrove trees very abundant, Changi! Chan Chu Kang!.

B. (§ MONANTHAPARVA) AVICELLA, *Ridl., sp. nova.* *Rhizoma* elongatum, gracillimum. *Pseudo-bulbi* $\frac{1}{2}$ poll. longi, pyriformes, rugosi, læte virentes, inter se 1 poll. distantes. *Folium* $\frac{3}{4}$ poll. longum, $\frac{7}{16}$ poll. latum, exacte ovatum, subacutum, crassum, coriaceum, carinatum canaliculatum, atroviride. *Scapi* $\frac{1}{4}$ poll. longi, 1-flori; bracteæ minimæ, cupuliformes, mucronatæ. *Flores* parvi, reversi. *Sepalum* posticum $\frac{1}{4}$ poll. longum, lanceolatum acutum virens, lateralia multo latiora conniventia cymbæformia acuta atro-kermesina. *Petala* minima, cuneata, mucronata, pallida. *Labellum* brevissime stipitatum; unguis incrassatus, erectus; lamina lanceolata subobtusa, porrecta, plana, angusta, aurantiaca subtus purpurea, papillosa; carina media, basi kermesina. *Columna* crassa, rosea; pes curvus, subæqualis; stelidia elongata, linearia, apice truncata subbiloba, lobo superiore brevissimo, inferiore decurvo-falcato. *Anthera* apice rotundata, margine rostrato; rostellum brevissimum subtriangulum, obtusum. *Stigma* ovatum, latum. *Capsula* $\frac{1}{2}$ poll. longa, pro flore maxima, erecta, ovoidea; carinæ 6, acutæ, magnæ, æquales.

Hab. Singapore: Kranji, Bajan (2361), Toas, on mangroves!

This little plant is very common in the mangrove swamps, but is seldom to be met with in flower. It climbs on the stems and branches low down. The flowers are borne on very short scapes, sometimes singly close to a pseudo-bulb, sometimes one on each side of a pseudo-bulb, or again, sometimes, at some distance from it. They are reversed, *i.e.*, the lateral sepals are uppermost, and open but a little, resembling the head of some large-beaked bird. The lateral sepals are dark crimson, and meet together by their edges, so as to form a kind of reversed boat. The petals are small and inconspicuous. The lip is shorter than the sepals, narrow, with a thickened claw, orange-coloured, with a crimson groove at the base, and minutely papillose. The capsule is very large in proportion to the size of the flower, with very well-developed keels.

BULBOPHYLLUM (§ MONANTHAPARVA) VITELLINUM, *Ridl.*, *sp. nova.* *Rhizoma* elongatum, gracile. *Pseudo-bulbi* 1 poll. longi, conici, obliqui, quadrangulares, inter se $\frac{3}{4}$ poll. dissiti. Folium $1\frac{1}{2}$ poll. longum, $\frac{1}{2}$ poll. latum, lanceolatum, obtusum, pallide viride. *Pedunculi* $\frac{1}{2}$ poll. longi, capillares, 3–4 prope ad pseudo-bulbum congesti aut distantes; pedicellus cum flore expanso æquilongus, proventu 2-plo longior. *Flos* vix $\frac{1}{4}$ poll. longus. *Sepalum* posticum oblongo-ovatum aurantiacum apice a lineis 3 kermesinis nigro-maculatis marginatum, lateralia lanceolato ovata patentia flava. *Petala* cum $\frac{1}{2}$ parte sepali postici æquilonga obovato-oblonga, retusa, aurantiaca apice a 4 maculis atris glandulosis marginata, in margine minute ciliata. *Labellum* cum sepalo æquilongum, oblongum, obtusum, subcarnosum, aurantiacum, basi excavatum, canaliculatum. *Columna* breviuscula; pes productus; stelidia linearia, obtusa, longiuscula, erecta. *Capsula* $\frac{1}{2}$ poll. longa, fusiformis, pendula.

Hab. Sumatra ? (c. in Hort. Rauch, Singapore, Jan., 1894).

Belongs to the same set as *B. catenarium*, Ridl., but has larger bulbs and leaves than any of the species which I have seen. The flowers are, however, smaller than those of *B. coriaceum*, Ridl., from Kinabalu. The pedicel of the flower lengthens to double its size in the fruit.

This was found on a tree in a garden in Singapore with *B. Epicrianthes*, Hook. f., and *Dendrocolla fulgens*, mihi. All were said to have been obtained in Singapore, but I think they probably came from Sumatra.

B. (§ MONANTHAPARVA) MONANTHOS, *Ridl.*, *sp. nova.* *Rhizoma* gracillimum, longe repens; radices copiosæ. *Pseudo-bulbi*

$\frac{1}{3}$ poll. longi, ovoideo-conici, dissiti. *Folium* $1\frac{1}{2}$ poll. longum, $\frac{3}{8}$ poll. latum, elliptico-lanceolatum, obtusum. *Scapi* plurimi, 1 poll. longi, filiformes. *Flos* singulus, parvus; bractea cupuliformis, mucronata. *Sepalum* posticum lanceolatum obtusum rubronervium, lateralia (postico majora) ferme $\frac{1}{4}$ poll. longa lanceolata acuta flava. *Petala* cum $\frac{1}{2}$ parte sepali vix æquilonga, late ovata acuta, apice purpurea. *Labellum* sepalis brevius, lanceolatum, planum, subobtusum, flavum basi purpureo-maculatum. *Columna* breviuscula; stelidia longa, subulata, ascendentia. *Anthera* ovata, depressa.

Hab. Siam: Pungah, Kasoom Road, *C. Curtis!*

This species, of which I have seen but one flower, is closely allied to *B. catenarium,* Ridl., which it much resembles in the form of the flower, but the pseudo-bulbs and foliage more resemble those of *B. modestum,* Hook., f. The bract is like that of *B. Avicella,* Ridl., a wineglass-shaped cup, from one side of which projects a small point or mucro.

BULBOPHYLLUM CLANDESTINUM, *Lindl., Bot. Reg.* (1841) *Misc.,* p. 77.

Hab. Singapore: Very common; Kranji, Tanglia, Sungei Morai, Chan Chu Kang!
Johore: Kota Tinggi!
Malacca: Batu Berendam (R. Derry)!
Penang: Telak Tikus, *C. Curtis!*
Pahang: Pekan, Tahan River!
Perak: *Scortechini.*
Also Rhio! (*Native Collector*). Java, *Dr. Treub!*

Abundant on trees in open country, river banks, &c.

B. CAPITATUM, *Lindl., Gen. et Sp. Orch.,* p. 56.

Hab. Johore: Batu Pahat, *Lake and Kelsall!*
Penang: Government Hill, *Curtis!*
Perak: Gunong Hijan! Gunong Batu Putih, *Wray.*
Also occurs in Java and Borneo.

The flowers are orange red, brightest at the tips of the sepals. They are not really capitate, as the name implies, but in short racemes. It appears to be always a native of hill districts.

B. EPICRIANTHES, *Hook. f., Fl. Brit. Ind.,* v. p. 753.

In specimens cultivated here, I find 14 petal threads, two pairs of threes, and two single ones. They are not strap-

shaped, but terete and clubbed, dark grey at the apices, white at the base. The plants were brought to me from the same tree as *B. vitellinum*, mihi.

BULBOPHYLLUM MODESTUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 759, *Ic. Pl.*, t. 2038, B.

Hab. Perak: Maxwell's Hill! 2,000 feet alt.

A small long creeping species with green flowers, growing on stumps on the ground.

B. CONCINNUM, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 187, *Ic. Pl.*, t. 2038, A.

Hab. Singapore: abundant! Kranji! Sungei Buloh! North Selitar!
Johore: Sungei Kahang, *Lake and Kelsall!*
Also Borneo: *Dr. Haviland.*

This is common on branches of trees in the Singapore mangrove swamps, and especially where there is much moss. The flowers, though small, are very pretty, being of a bright flame colour, darkest at the points of the sepals, much after the style of those of *B. capitatum*, Lindl.

B. VERMICULARE, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 188.

Hab. Singapore: Selitar! Kranji! Sungei Morai! Changi!
Johore: Kwala Kahang!

Very common in the mangrove swamps, its long slender rhizome creeping far on the branches. Flowers greenish white.

B. ADENOPETALUM, *Lindl.*, *Bot. Reg.* (1842) *Misc.*, p. 85; *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 188.

Hab. "Singapore: Hort. Loddiges."

B. APODUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 766, *Ic. Pl.*, t. 2043.

Hab. Singapore: Kranji, Chan Chu Kang, North Selitar!
Johore: Tanah Runto!
Malacca: Merliman!
Perak: Batu Kuran, *Scortechini*; The Cottage, Thaiping Hills! alt. 4,000 feet.
Also Djambi (Sumatra!)

Rather a common species with lemon-yellow flowers emitting a somewhat unpleasant odour. It usually grows in masses on tolerably high trees in thick woods. A form found on the top of the Thaiping Hills differed in having the sepals more pointed and keeled.

BULBOPHYLLUM LEPTOSEPALUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 767, *Ic. Pl.*, t. 2045.

Hab. Malacca: *Maingay.*
Penang: Government Hill, *C. Curtis!*
Perak: Hermitage Hill!

Flower, greenish-yellow.

B. ODORATUM, *Lindl.*, *Gen. et Sp. Orch.*, p. 54.

[Lindley merely places in the genus *Bulbophyllum* the *Diphyes odorata*, Blume (Bijdr. 312), adding nothing to the meagre description of Blume. The plant, which from the description I conclude to be Blume's *Diphyes odorata*, occurs in the Malay Peninsula as well as in Java and Borneo; I add a full description of this.] Epiphyticum. *Rhizoma* longe repens, lignosum. *Pseudo-bulbi* minimi, globosi, vix distincti. *Folium* 7–8 poll. longum, 1 poll. latum, oblanceolatum, obtusum, subpetiolatum, coriaceum, apice rotundatum. *Scapus* 1½ ped. longus, ferme omnino floriferus, crassus, angulatus, pallide viridis, basi a vaginis paucis suffultus. *Flores* parvi, copiosi, subverticillati, reversi, aurantiaci mox albi; bracteæ ⅛ poll. longæ, cum ovariis æquilongæ, lanceolatæ, acuminatæ, albæ. *Sepala* e basi triangulari lanceolato-linearia, acuminata, aurantiaca mox alba; mentum nullum. *Petala* minima, cum columnâ æquilonga, ovato-lanceolata, alba. *Labellum* minimum, crassum, album vel aurantiacum; lobi laterales majusculi, erecti, rotundati, medius brevis linguiformis planus obtusus. *Columna* crassa, alba; pes crassus, porrectus, oblongus; stelidia integra vel bidentata, dente antico elongato angusto acuto, postico brevi subobtuso sæpe obsoleto. *Anthera* depressa, tenuis. *Stigma* magnum, subcuneatum.

Hab. Pahang: Kwala Jahan!
Borneo: often brought by collectors.
Java: *Dr. Treub!*

This species has a long slender raceme of innumerable flowers, orange-coloured in the bud and when first open, and finally white. They are sweet-scented. There is a considerable amount of variation in the plant; the pseudo-bulb is often so slightly enlarged that it is difficult to distinguish it from the base of the leaf, sometimes it is dilated and forms a small globose body. The lip is sometimes entirely orange-coloured, sometimes white with an orange tip, and the size of the lateral lobes in proportion to the mid-lobe varies a good deal. The arms of the column are sometimes quite simple, and sometimes have an accessory tooth at the back.

BULBOPHYLLUM PEDICELLATUM, *Ridl. in Journ. Linn. Soc. (Bot.)*, xxxi. (1896) p. 278, t. 14.

Hab. Siam: Pungah, *C. Curtis!*

Also Borneo.

Flowers light yellow, sweetly scented.

B. GLOBULUS, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 767, *Ic. Pl.*, t. 2047.

Hab. Perak: *Scortechini.*

I have never met with this.

B. WRAYI, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 766, *Ic. Pl.*, t. 2044.

Hab. Perak: Gunong Berumbun Pahang, *Wray.*

I have not met with this.

B. LASIANTHUM, *Lindl. in Gard. Chron.* (1855), p. 53.

Hab. Penang: On the big rock on the top of Government Hill!

Perak: *Scortechini.*

B. (§ RACEMOSÆ) BOTRYOPHORUM, *Ridl.*, *sp. nova.* Dense cæspitosa, ebulbosa. *Rhizoma* longe repens, a foliis undique tectum. *Folia* 1 poll. longa, ½ poll. lata, elliptica, plana, carnosa, atro-viridia subtus pallidiora, canaliculata, apice integra, inter se ¼ poll. distantia. *Racemi* ½ poll. longi, penduli; rhachis crassiuscula; bracteæ minutæ, ovatæ. *Flores* minimi, vix ⅛ poll. lati, pauci, congesti, atropurpurei. *Sepalum* posticum lanceolatum acuminatum pallidum a striis 3 rubris percursum, lateralia multo majora semiovata falcata cymbiformia atrokermesina. *Petala* majuscula, quadrata, truncata, basi ad sepalum posticum adnata, in margine pallida atrokermesina denticulata. *Labellum* carnosum; unguis brevis, pallidus, truncatus; lamina ovato-elliptica, obtusa, decurva, atropurpurea, papillosa, basi a carinâ semicirculari elevatâ ornata. *Columna* pro genere alta; venter canaliculatum; margines involuti; clinandrium parvum, profundum. *Anthera* magna, galeata pustulosa, rubra, margine antico retuso; pollinia globosa, aurantiaca; stelidia magna, crassa, rotundata, kermesina. *Capsula* ½ poll. longa, oblongo-elliptica, sessilis, purpurascenti-viridis; costæ æquales nec carinatæ.

Hab. Singapore: Sungei Buloh, Toas, Kranji!
Pahang: Near Pekan!

This plant grows thickly on branches and trunks of trees, especially on the borders of mangrove swamps. The leaves lie flat on the rhizome, and the flowers are crowded into small pendulous bunches. It is quite unlike any other species from this region, but the flowers somewhat resemble in structure those of another species from Madagascar.

BULBOPHYLLUM (§ RACEMOSÆ) ROSEUM, *Ridl., sp. nova.* *Rhizoma* breve, gracile. *Pseudo-bulbi* $\frac{1}{2}$ poll. longi, $\frac{3}{8}$ poll. crassi, subglobosi, approximati, atrovirides. *Folium* 3 poll. longum, $\frac{1}{2}$ poll. latum, anguste lanceolatum acuminatum acutum, carnosum, atroviride. *Racemus* 1 poll. longus, usque ad 4-florus; bracteæ lanceolatæ, acutæ, ovario breviores. *Flores* $\frac{3}{8}$ poll. longi. *Sepala* ovato-lanceolata acuta, pallide rosea. Petala sepalis multo minora, linearia. *Labellum* sepalis paullisper longius, sessile, ellipticum obtusum, planum, carnosum, cerasinum; carinæ 2 curvæ, basi dissitæ, in laminâ mediâ approximatæ. *Columna* recta, longiuscula, rosea; pes brevior; stelidia obscura, antherâ breviora. *Anthera* ovata. *Stigma* majusculum, subrotundum.

Hab. Siam: Pungah, *C. Curtis!*

B. (§ RACEMOSÆ) LILACINUM, *Ridl., sp. nova.* *Rhizoma* validulum, lignosum; radices copiosæ, graciles. *Pseudo-bulbi* $1\frac{1}{2}$ poll. longi, 1 poll. lati, conici, crassi, longe dissiti. *Folium* 5 poll. longum, 1 poll. latum, oblongo-lanceolatum, crassum, subpetiolatum; petiolus $\frac{1}{4}$ poll. longus. *Scapus* $1\frac{1}{2}$ poll. longus, crassus, pseudo-bulbo approximatus, a vaginis tectus; racemus 3 poll. longus, densus. *Flores* plurimi, $\frac{1}{2}$ poll. longi; bracteæ $\frac{1}{4}$ poll. longæ, cum ovariis æquilongæ, lanceolatæ acuminatæ. *Sepalum* posticum lanceolatum acutum, lateralia longiora approximata. *Petala* sepalis multo breviora, late ovata, apice subulata. *Labellum* sepalis multo brevius, basi in canaliculo 2-carinatum; unguis crassus; lamina lanceolata obtusa, plana, recta; sepala petala pallide lilacina (in marginibus sepalorum et labelli canaliculo præsertim) roseo-punctata. *Columna* erecta, longiuscula; pes cum columnâ æquilongus, ab hâc ferme liber; stelidia erecta, lanceolata acuta, antheram superantia. *Stigma* magnum, rotundatum.

Hab. Kedah: Kedah Peak!
Southern Siam: *C. Curtis!*

This species is allied to *B. Pechei* (Hort. Bull) from Moulmein.

BULBOPHYLLUM (§ RACEMOSÆ) DENSIFLORUM, *Ridl.*, *sp. nova.* *Rhizoma* longissimum, lignosum, crassum; internodi $\frac{1}{3}$ poll. longi, a vaginarum fibrillis tecti; radices paucæ, graciles. *Pseudo-bulbi* 1 poll. longi $\frac{1}{4}$ poll. lati, anguste oblongi, teretes paullisper compressi, basi haud incrassati, inter se (usque ad 6 poll.) distantes, atrovirides basi purpurascentes. *Folium* 12 poll. longum, 1–2 poll. latum, anguste lanceolatum acuminatum acutum, tenuiter coriaceum, atroviride in dorso pallidius, canaliculatum, carinatum. *Racemus* 2-poll. longus, densus, pendulus; pedunculus $1\frac{1}{2}$ poll. longus, crassus, a vaginis ampliatis olivaceis rubropunctatis tectus. *Flores* parvuli; bracteæ ferme $\frac{1}{2}$ poll. longæ, lanceolatæ, ovarium breve minute pubescens pedicellumque superantes. *Sepalum* posticum $\frac{3}{8}$ poll. longum, ovatum, lanceolatum, carinatum, mucronatum, basi virescens apice extùs purpurascens purpureo-punctatum, lateralia $\frac{5}{8}$ poll. longa, postico longiora, lanceolata acuminata acuta, carinata, torta, porrecta, colore (quam sepali postici) pallidiore; margines approximati. *Petala* $\frac{1}{4}$ poll. longa, lanceolata, mucronata. *Labellum* linguæforme, carnosum, purpureum, basi profunde canaliculatum, apice decurvum; margines erecti, carinati. *Columna* ferme globosa, brevis, albescens purpureo-punctata; pes angustus, apice liber; stelidia erecta triangularia, acuta. *Stigma* parvum, profundum. *Capsula* $1\frac{1}{2}$ poll. longa, crassa, elongata, pyriformis.

Hab. Singapore: Selitar! Bukit Mandai! Bukit Timah! Kranji! Choa Chu Kang!

Allied to *B. crassipes*, Hook. f., but with different foliar organs, and differently coloured flowers. It frequents the trunks of trees, usually in dense woods.

B. CRASSIPES, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 760.
Hab. "Penang: Herb. Lindl."
I have not met with this.

B. LIMBATUM, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 74.
Hab. "Singapore: (Hort. Loddiges)."

B. (§ RACEMOSÆ) GIGAS, *Ridl.*, *sp. nova.* *Rhizoma* elongatum, lignosum, ramosum. *Pseudo-bulbi* $\frac{1}{3}$–$\frac{3}{4}$ poll. longi, $\frac{1}{2}$ poll. crassi, cylindrici, longe (usque ad 6 poll.) dissiti. *Folium* 18 poll. longum, 6 poll. latum, obovatum aut oblanceolatum, coriaceum, carinatum, in petiolum longum attenuatum. *Scapus* 1½ ped. longus, crassus, erectus, pseudo-bulbo approximatus; vaginæ ferme 4 poll. longæ, superne ampliatæ remotæ. *Racemus* 5 poll. longus, densus, multiflorus, nutans; bracteæ ½-¾ poll. longæ, ovatæ, flores ferme tegentes. *Flores* ½ poll. longi, breviter pedicellati. *Sepala* lanceolata acuta, lateralia a mento gibboso brevi aucta. *Petala* sepalis angustiora, linearia; sepala petala alba rubro-maculata. *Labellum* parvum, sessile, columnâ brevius, hastatum, obtusum, aurantiacum, basi incrassatum emarginatum, apice decurvum; carinæ 2, subparallelæ. *Columna* crassa, alba, maculis purpureis 2 parvis in stigmatis latere, 1 magnâ in basi sitis; pes breviusculus, aurantiacus; stelidia 2-dentata, dente postico brevissimo, antico longiore acuto. *Capsula* 1½ poll. longa, elongato-pyriformis.

Hab. Perak: On rocks and trees at Maxwell's Hill, Larut Hills!

This is, I think, the largest of all known *Bulbophylla*, as far at least as foliar organs go. It is an ally evidently of *B. Beccarii*, Reichb. f. The racemes are dense, but not large, and the flowers by no means conspicuous.

BULBOPHYLLUM (§ RACEMOSÆ) TRIFOLIUM, *Ridl.*, *sp. nova*. *Pseudo-bulbi* ¼ poll. longi, compacte aggregati, conoideo-ovoidei, virides; radices copiosæ, fibrosæ. *Folium* 6 poll. longum, 1 poll. latum, lanceolatum acutum, subtus pallidius; margines et carina vix elevata purpurascentes. *Scapus* 1 poll. longus, crassus, albus, à vaginâ bruneâ tectus; racemus ½ poll. longus, erectus, capitatus. *Flores* parvi, dense congesti; ovaria brevissima, pubescentia, viridia; bracteæ lanceolatæ acutæ, pubescentes, albæ. *Sepalum* posticum late lanceolatum acutum, pubescens, a striis 3 roseo-striatum, lateralia postico longiora obliqua lanceolata ab acumine excurvo acuminata tristriata pubescentia a maculâ kermesinâ basali striis punctisque roseis ornata. *Petala* sepalo postico breviora, lineari-lorata obtusa, unistriata, pubescentia, rosea. *Labellum* breve, unguiculatum, linguæforme, apice rotundato carnosulum, canaliculatum, album roseo-kermesino crebre punctatum, verrucosum; canaliculus medius, atrokermesinus. *Columna* brevis, flavescenti-viridis; dens magnus, albus, porrectus, e ventre ortus; pes longus, planus,

albus rubro-marginatus. *Anthera* obtuse conica, margine recto; stelidia elongata, lata, truncata, suberecta.

Hab. Singapore: Sungei Morai! (Flowers Aug.–Dec.).

A very curious plant with a capitulum looking like a head of pink clover (*Trifolium medium*, Linn.). The pubescence of the flowers and the remarkable tooth on the face of the column are its most striking peculiarities.

BULBOPHYLLUM (§ INTERVALLATÆ), STELLA, *Ridl. in Journ. Linn. Soc.* (*Bot.*) xxxi. (1896) p. 277.

Hab. Singapore: Bukit Mandai! Jurong! Choa Chu Kang!
Kedah: Woods on Kedah Peak!
Perak?: (A sketch among Scortechini's drawings.)

This grows on the stems of trees in thick jungle.

B. (§ INTERVALLATÆ) CLEISTOGAMUM, *Ridl. in Journ. Linn. Soc.* (*Bot.*) xxxi. (1896) p. 277.

Hab. Perak: Waterloo, *C. Curtis.*
Rhio: (*Native collector*).

CIRRHOPETALUM, Lindl.

C. MEDUSÆ, *Lindl.*, *Bot. Reg.* (1842), t. 12.

Hab. Singapore: Tanglin! On trees by the roadside, Bukit Timah, and on very lofty trees, Chan Chu Kang!
Johore: Tengarah, *T. Feilding!*
Perak: Dindings at Lumut!
Pahang: Tahan River!

This does not seem to be a very uncommon plant, but it so frequently inhabits the tops of the loftiest trees that it is often quite inaccessible.

C. VAGINATUM, *Lindl.*, *Gen. et Sp. Orch.*, p. 59, *et in Wall. List*, n. 1979.

Hab. Singapore: Tanglin, &c.!
Johore: Tana Runto!
Selangor: Bukit Hitam, *Kelsall!* Sepan! Petaling!
Malacca: Ching! Mt. Ophir!
Pahang: Kwala Pahang! Kwantan! Cherating!
Penang: Government Hill, *C. Curtis!*

The commonest species here, often densely covering branches of trees. The flowers are of a pale straw-colour. It is very floriferous and easy of cultivation.

CIRRHOPETALUM PSITTACOIDES, *Ridl., sp. nova. Rhizoma* breve. *Pseudo-bulbi* $\frac{1}{2}$ poll. longi, congesti, conici, rugosi neque angulati. *Folium* 4 poll. longum, 1 poll. latum, elliptico-lanceolatum obtusum, coriaceum, apice bifidum. *Scapus* 8 poll. longus, gracillimus, ruber. *Flores* pro genere minimi, 8–9-nim verticillati; bracteæ $\frac{1}{25}$ poll. longæ, lanceolatæ acuminatæ. *Ovarium* cum pedicello $\frac{1}{4}$ poll. longum, rubrum. *Sepalum* posticum ovatum, cucullatum, longe cuspidatum, in margine ciliatum, basi flavum apice rubrum, lateralia $1\frac{1}{2}$ poll. longa basi connata tubum ore rotundatum formantia apice libera longe setacea omnino (maculis 2 flavis in tubi ore sitis exceptis) atro-rubentia. *Petala* lanceolata acuminata, longe aristata, in margine ciliata. *Labellum* linguæforme, ovatum acutum, carnosum, violaceum in mediâ parte pallidius lucidum. *Columna* conica, in pede lato sigmoideo flava, in ventre rubro-punctata; stelidia lata, tenuia, translucentia.

Hab. Singapore: On Freshwater Island, south of Singapore!
Johore: Batu Pahat, *Lake and Kelsall!*
Malacca: *N. Cantley!*

This is a very distinct little species, and, though the flowers are small, is really pretty. The lateral sepals are so bent and connate at the base as to form a tube with a circular mouth, over which hangs the small violet lip. Their apices are separate and hang down, and are very slender and setaceous. The petals are rather long in proportion and strongly ciliate. The flowers form a perfect circle and look like a series of very small parrots' heads, the lip representing the beak. They are (as indeed all the *Cirrhopetala* are) fertilized by a minute Dipteron, which usually settles upon the long pendent sepals and climbs up them till it reaches the lip upon which it sits, and when it has got beyond the balancing point of the lip is pitched off upon the column, where it receives the pollinia. I have seen one fly ride on the lips of all the flowers in an umbel in turn, but as a rule only one or two flowers at most are fertilized.

C. LONGISSIMUM, *Ridl., sp. nova. Rhizoma* crassiusculum. *Pseudo-bulbi* 1 poll. longi, $\frac{1}{2}$ poll. crassi, congesti, conici, curvi. *Folium* 6–8 poll. longum, 1 poll. latum, oblongo-lanceolatum

acutum; coriaceum, basi tortum; petiolus crassus. *Scapus* 8 poll. longus, pendulus, crassiusculus, basi cum pseudo-bulbo in vaginâ 1½ poll. longâ siccâ striatâ involutus; vaginæ 2–3, 1 poll. longæ, acuminatæ remotæ adduntur. *Umbella* 4-7-flora; bracteæ ⅓ poll. longæ, lanceolatæ acuminatæ. *Sepalum* posticum ¾ poll. longum ¼ poll. latum, lanceolatum caudatum, in margine minute ciliatum, carneum a nervis 5 rubris percursum, lateralia 8–12 poll. longa pallide carnea usque ad ⅓–½ longitudinem connata apice libera filiformia. *Petala* ¼ poll. longa, lanceolata, falcata, in margine ciliata, rosea. *Labellum* longius, linguæforme, acutum, carnosum, in medio canaliculatum, album. *Columna* majuscula; stelidia brevia, obtusa; clinandrium in margine minute denticulatum. *Anthera* oblonga, depressa, atra; rostrum obtusum.

Hab. Siam: Punga, *C. Curtis* (Fl. H. B. Penang, Oct. 1893).

This species is remarkable for the immense length of the lateral sepals, which are upwards of a foot long. They are connate for from a half to a third of their length, the free portions being exceedingly slender. The dorsal sepal is minutely ciliate, the dark pink petals more distinctly so, the trichomes in the latter being glandular and very different from those of such species as *C. gamosepalum*, Griff. The column is rather thin textured, the lip large and fleshy, of a dirty white.

CIRRHOPETALUM GAMOSEPALUM, *Griff.*, *Notul.*, iii. p. 296.

Hab. Singapore: Bajan! &c., common.
Johore: Batu Pahat! Sungei Kahang, common, *Lake and Kelsall.*
Malacca: Sungei Rambei!
Perak: *Scortechini.*
Also Borneo and Sumatra, Tenasserim and the Andaman Isles.

I take this to be the correct name of a plant much resembling *C. concinnum*, Hook. f., but with a very much longer scape. It is very variable in colouring on account of the varying preponderance of pink or crimson specks, the ground colour of the flowers being cream yellow. Perhaps more than one species is mixed in the description in the ‘Flora of British India,’ for in the Malay Peninsula species the lateral sepals are nearly always connate for their whole length, the tips only being free, and even if they are free for some way up they never become “widely divergent.”

CIRRHOPETALUM GAMOSEPALUM *var.* ANGUSTUM, *Ridl.*, *var. nova.*

Folia angusta lanceolata basi acuminata. Sepala lateralia angustiora longiora. Stelidia erecta nec prosilientia acutiora. Columnæ pes latior, apex dilatatus.

Hab. Borneo: Sandakan, *Mr. Pryer.*

This is a rather distinct looking form with narrower leaves and longer acuter sepals. The flowers have more rose colour and less buff in them, and the lip is entirely brown, without the yellow tip which typical *C. gamosepalum* possesses.

C. CONCINNUM, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 190, *Ic. Pl.*, t. 2060 B.

Hab. Singapore: Chan Chu Kang! Kranji! &c.
Johore: Tana Runto!
Also Rhio!

A common and variable species, growing usually low down on trees. A very distinct looking variety is:—

—*Var.* PURPUREUM, *Ridl.*, *var. nova.*

Pseudo-bulbi et folia formæ typicæ. *Flores* paullo majores, atro-kermesini. *Sepalum* posticum minus, $\frac{3}{16}$ poll. longum, atrokermesinum ciliis concoloribus, lateralia $\frac{3}{8}$ poll. longum, $\frac{3}{16}$ poll. lata, decurva, in vivo canaliculata. *Labellum* magis abrupte curvum, flavescens, in margine fuscum. *Columna* flavescens, roseo-maculata; pes longus, gradatim curvus, longior et angustior.

Hab. Penang: Government Hill!

This has the whole flower of a deep crimson colour, and there are a few minor differences in the proportion of the parts. It has much the resemblance of *C. Cumingii*, Lindl., Bot. Mag., t. 4996, from the Philippines.

C. ACUMINATUM, *Ridl.*, *sp. nova. Rhizoma* elongatum, tenue. *Pseudo-bulbi* $\frac{1}{2}$ poll. longi, fusiformi-conici, atrovirides, pluri sulcati, inter se 1 poll. distantes. *Folia* 3 poll. longa, ferme 1 poll. lata, oblanceolata acuminata, apice obtusa inæqualiter biloba. *Scapus* 6 poll. longus, gracilis, tenuis, purpureus, usque ad 5-florus. *Flores* majusculi, imperfecte umbellati; bracteæ cum $\frac{1}{2}$ parte pedicelli vix æquilongæ, lanceolatæ acutæ, purpureæ. *Sepalum* posticum ovatum, ab aristâ longâ ciliatâ aristatum, aurantiacum rubro-striatum, lateralia angusta elongata acuminata libera convoluta, basi rufescentia apice divaricata flava. *Petala* ovata, longe aristata, ciliata, aurantiaca rubro-

striata. *Labellum* breve, obtusum, virescens purpureo-punctatum, haud multo arcuatum; anguli postici obtusi. *Columna* longiuscula, crassiuscula, virescens, in ventre purpureo-punctata. *Anthera* obtusa, conica, carinata; stelidia brevia, angulata. *Stigma* majusculum, margine rotundato.

Hab. Singapore: Choa Chu Kang!

I have only once collected this. It is allied to *C. gamosepalum*, Griff., but the flowers are larger and fewer, forming only a segment of a circle, with the lateral sepals not connate, narrow and acuminate.

CIRRHOPETALUM MICROBULBON, *Ridl., sp. nova. Rhizoma* gracilis. *Pseudo-bulbi* $\frac{1}{8}$ poll. longi, globosi, inter se 1 poll. dissiti. *Folium* $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longum, $\frac{3}{4}$ poll. latum, ellipticum vel obovatum, obtusum, coriaceum. *Scapus* 5 poll. longus, gracillimus filiformis; bracteæ 2–3 parvæ, lanceolatæ, dissitæ. *Umbella* parva, usque ad 8-flora; bracteæ $\frac{1}{16}$ poll. longæ, lanceolatæ. *Flores* parvi. *Sepalum* posticum ovatum, cuspidatum, in margine ciliatum, lateralia $\frac{1}{2}$ poll. longa anguste linearia libera rosea. *Petala* cum sepalo postico æquilonga, lanceolata cuspidata, ciliata. *Labellum* minimum, ovatum.

Hab. Singapore: Sungei Buru! v.s.

I have only met with this once. It is easily distinguished by its very small pseudo-bulbs, very slender scape, and small flowers with very narrow lateral sepals.

C. LINEARIFOLIUM, *Ridl., sp. nova. Rhizoma* longe repens, gracile, in majore parte a vaginis papyraceis tectum. *Pseudo-bulbi* $\frac{1}{3}$ poll. longi, conico-cylindrici, atrovirides, lucidi, inter se usque ad 2 poll. distantes. *Folium* 4 poll. longum, $\frac{1}{2}$ poll. latum, anguste lineari-lanceolatum, obtusum apice bilobum, canaliculatum, ecarinatum, læte-virens. *Scapus* 6 poll. longus, gracilis, rufescens; vaginæ dissitæ. *Flores* pauci, parvi; bracteæ $\frac{1}{4}$ longæ, cum pedicello æquilongæ, lineares, acutæ, virides. *Sepalum* posticum lanceolatum acutum virescens atropurpureo-striatum purpureo ciliato-marginatum, lateralia ferme omnino connata lineari-acuminata apice libera setacea pallide roseo-rubentia. *Petala* triangularia lanceolata acuminata, virescentia purpureo-striata. *Labellum* linguæforme subacutum, curvum, carnosum, atropurpureum; anguli basi acuti. *Columnæ* stelidia brevia, obscura.

Hab. Singapore: Kranji! Bukit Mandai! Choa Chu Kang!

This usually grows on the lower part of the stems of the Nibong Palm, *Oncosperma filamentosum*, Blume, creeping up and around the stems. It is a poor and insignificant species, easily distinguished by its long slender rhizome, with distant pseudo-bulbs and narrow leaves.

CIRRHOPETALUM SEMIBIFIDUM, *Ridl., sp. nova.* *Pseudo-bulbi* vix ¼ poll. longi, conici, angulati, virides, in rhizomate gracili dissiti. *Folium* 1½ poll. longum, ½ poll. latum, lanceolatum subacutum, coriaceum, atroviride, non carinatum. *Scapus* 4 poll. longus, gracillimus, atrokermesinus; vaginæ 3–4, ⅛ poll. longæ, acuminatæ, albescentes. *Umbella* ferme circularis, 5-flora; bracteæ lineares, acuminatæ, rufæ; pedicellus cum ovario ⅛ poll. longus. *Sepalum* posticum ovatum acuminatum roseum obscurius striatum in margine ciliatum, lateralia 1½ poll. longa, usque ad dimidiam partem connata, 3/16 poll. in diam, obscure rosea, apicibus subdivaricatis loratis acuminatis acutis. *Petala* ovata lanceolata acuta, falcata, in margine ciliata. *Labellum* linguæforme, curvum, roseum apice pallidum. *Columna* longiuscula, flava. *Anthera* elongata, conica; stelidia brevia, rotundata.

Hab. Singapore: Kranji! v.v.

This is allied to *C. gamosepalum*, Griff., but has much smaller pseudo-bulbs ½ to ¾ inch apart on the slender rhizome, very narrow lateral sepals connate for half their length and then separate with narrow diverging points, and the flowers are deep crimson.

C. AURATUM, *Lindl., Bot. Reg.* (1840) *Misc.*, p. 50; (1843) t. 61.

Hab. Selangor: Seppan, on trees overhanging the river; scarce.

This is a charming plant closely allied to *C. elegans*, Teysm. and Binn., of Java, and much resembling it, differing in the free lateral sepals and the entire not denticulate stelidia. The figure in the Botanical Register is less deeply coloured than the Selangor plant. The name *auratum* is peculiarly inappropriate, as the yellow colour is the least conspicuous in the flower. It has an odour like that of a mushroom.

C. MAKOYANUM, *Reichb. f. in Gard. Chron.* (1879) I. p. 234; *Hook. f., Bot. Mag.*, t. 7259.

Hab. Singapore: Chan Chu Kang!

CIRRHOPETALUM MAKOYANUM *var.* BRIENIANUM, *i.e.*, *C. Brienianum*, Rolfe, in Kew Bulletin (1893) p. 62.

Hab. Johore: Gunong Pauti! 2,000 feet alt.
Perak: Thaiping!

This was first described by Reichenbach as from Brazil and figured in the 'Botanical Magazine' without locality. It is not common in the peninsula, but seems to be plentiful in Borneo. The plant varies a good deal in the form of the pseudo-bulb; one form has large thick approximate bulbs usually four-angled and broad elliptic leaves; the other has a slender rhizome, small distant pseudo-bulbs, and narrower lanceolate leaves. What I take to be Rolfe's *C. Brienianum* is only different in colour. I have compared both plants, the spotted one, *C. Makoyanum*, Reichb. f., and *C. Brienianum*, Rolfe, very carefully, and cannot see any constant difference in form in any part, and as the colouring of the typical one varies a good deal, I put *Brienianum* as a variety.

Both forms come from Borneo as well as the peninsula.

CIRRHOPETALUM CITRINUM, *Ridl. in Journ. Linn. Soc.* (*Bot.*) xxxi. (1896) p. 279.

Hab. Singapore: Freshwater Island! Tanjong Gol! Kranji! Sungei Buluh!
Malacca: Mt. Ophir!
Perak: Thaiping!

C. LONGESCAPUM, *Teysm. and Binn. in Tijdschr. Nederl. Ind.*, xxiv. (1862) p. 310.

Hab. "Penang, Lobb."

I have not met with anything answering to the description of this, which is described as having two-leaved pseudo-bulbs, a thing unknown in any *Cirrhopetalum* or *Bulbophyllum*. The type specimen in Herb. Buitenzorg consists merely of a portion of the scape without the flowers.

C. PLANIBULBE, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 364, t. 64.

Hab. Pahang: Pekan!
Kedah: Yan! On trees.

C. (§ EPHIPPIUM) BLUMEI, *Lindl.*, *Gen. et Sp. Orch.*, p. 59. *Rhizoma* ¼ poll. crassum, ramosum. *Pseudo-bulbi* 1–1½ poll. longum, ½ poll. crassum, conici, sulcati, virides. *Folium* 4 poll.

longum, $\frac{3}{4}$ poll. latum, lanceolatum acutum, basi longe angustatum atroviride. *Scapus* 3 poll. longus, filiformis, 1-florus; pedicellus cum ovario $\frac{1}{2}$ poll. longus; bractea lanceolata, arcte adpressa. *Sepalum* posticum 1 poll. longum $\frac{1}{8}$ poll. latum, lineari-lanceolatum subulatum, basi ciliato-marginatum, roseum vel kermesinum albo-marginatum, lateralia $1\frac{1}{2}$ poll. longa lanceolata subulata, falcata, glabra, rosea apice marginibusque flavescentia aut alba. *Petala* parva, oblique lanceolata acuta, basi approximata apice divergentia, glabra, rosea, basi in margine inferiore denticulata, a pustulis minutis atropurpureis ornata. *Labellum* vix $\frac{1}{2}$ poll. longum, linguæforme, stipitatum, basi crassum canaliculatum ciliatum, apice subulatum. *Columna* recta; stelidia dentiformia acuta, antheram oblongam conicam superantia. *Stigma* longum, angustum. *Ephippium ciliatum*, Blume, Bijdr., p. 309.

Hab. Singapore: Kranji! Mangrove swamps rare, Sungei Buloh! Chan Chu Kang!
Java: Buitenzorg!

The description of *Ephippium ciliatum*, Blume, is very meagre, nor does this plant seem to have been met with since nor described afresh. I have little doubt, however, that the plant above described was the species intended by Blume, the dorsal sepal being shorter than the lateral sepals. I have retained the species under the genus *Cirrhopetalum*, but it differs considerably from any other species known to me. The sepals are narrow, and end in long terete points. The petals are so placed that the upper margins at the base meet over and nearly conceal the anther: but the points diverge widely and the lower margins are turned outwards. The lip is thick at the base, and has a channel in the middle line. It terminates in a long subulate point. The column is rather tall, and the stelidia are erect. The pollinia are elliptic and longer in shape than is usual in the genus.

The Singapore form was darker in colour than that from Java, otherwise it appeared quite the same.

CIRRHOPETALUM (§ EPHIPPIUM) RESTREPIA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 365.

Hab. Pahang: Pekan! On trees.

This is certainly allied to the preceding species, having the solitary flower with large deflexed lateral sepals.

DENDROCHILUM, Blume.

DENDROCHILUM, *Blume.* The genus *Dendrochilum* was founded by Blume to include a number of plants which Bentham rightly separated into *Dendrochilum* and *Platyclinis*, the former including Blume's Section 1 of *Dendrochilum.* To this section Lindley added a Madagascar plant which has long been referred to *Bulbophyllum.*

Blume's species were *D. aurantiacum*, with orange flowers, and *D. pallideflavens*, with pale yellowish flowers.

Hooker (' Flora of British India ') gives three species from the Malay Peninsula—*D. pallidiflorum*, Blume (misprint for *D. pallideflavens*, Blume), *D. linearifolium*, Hook. f. (which from the Icones plantarum, fig. 1859, is, it appears to me, a *Platyclinis*) and *D. bracteosum*, Reichb. f., collected in the "Malay Peninsula" by Finlayson. I have met with two more species, apparently undescribed, viz., *D. crassum* and *D. album*, mihi, and two others too incomplete for description, one a small species with narrow leaves and greenish-white flowers collected on Bukit Hitam, in Selangor, by Lieut. Kelsall, and another, with a much branched rhizome, thin-textured oblanceolate leaves, and very curious short three-lobed capsules, which I found without flowers on a tree far up the Tahan Valley, in Pahang.

D. PALLIDEFLAVENS, *Blume*, *Bijdr.*, p. 399, t. 52.

Hab. Perak: up to 4,000 feet, *Scortechini*, *King's Collector.* (I have not met with this.)

D. ALBUM, *Ridl.*, *sp. nova.* *Rhizoma* longum, $\frac{1}{8}$ poll. crassum, teres; internodi 1 poll. longi. *Pseudo-bulbi* 1 poll. longi, conici. *Folium* 3–4 poll longum, $\frac{3}{4}$–1 poll. latum, elliptico-lanceolatum obtusum; petiolus $\frac{1}{2}$ poll. longus. *Racemi* 4, 1 poll. longi, gracillimi, basi a bracteis membranaceis tecti; rhachis angulata. *Flores* parvi, copiosi, albi; bracteæ minimæ, pedicellis multo breviores, ovatæ. *Sepala* $\frac{1}{8}$ poll. longa, linearia, obtusa, carinata, apice incrassata. *Petala* subsimilia, minora. *Labellum* petalis brevius, lanceolatum subacutum; carinæ 2, basi elevatæ incrassatæ; canaliculus medianus, apice tenuior. *Columna* arcuata, superne incrassata; clinandrii margo dorsalis productus lanceolatus, apice bifidus, antheram parvam subglobosam multo superans; pes brevis; stelidia linearia acuminata, suberecta.

Hab. Perak: On trees at Maxwell's Hill, Larut Hill!
Siam: Pungah, on trees in damp shady places, *C. Curtis!*

The Siamese plant has thinner lanceolate acute leaves, and longer and more slender pseudo-bulbs, but appears to belong to the same species.

Dendrochilum crassum, *Ridl.*, *sp. nova.* *Rhizoma* $\frac{1}{4}$ poll. crassum, teres; internodi $\frac{1}{4}$–$\frac{3}{4}$ poll. longi. *Pseudo-bulbi* $\frac{1}{2}$ poll. longi, cylindrici. *Folium* 4 poll. longum, 1$\frac{1}{2}$ poll. latum, ellipticum obtusum, coriaceum; petiolus $\frac{1}{4}$ poll. longus. *Racemi* $\frac{3}{4}$ poll. longi, a floribus parvis undique tecti; rhachis angulata; bracteæ cum $\frac{2}{3}$ parte pedicelli æquilongæ, ovato-lanceolatæ. *Sepala* $\frac{1}{8}$ poll. longa et ultra, oblonga, obtusa, carnosa. *Petala* obovata, obtusa, carnosa. *Labellum* parvum, panduratum, apice late ovatum; carinæ 2, basi carnosæ. *Columna* apice cucullata, incrassata; pes brevissimus; clinandrii margo latus rotundatus, integer; stelidia lanceolata acuta, falcata; anthera majuscula.

Hab. Perak: Hermitage Hill!

This has broader and thicker leaves than the preceding, more fleshy flowers with broader sepals and petals, a pandurate lip, broad blunt entire hood to the column, and shorter falcate stelidia. The flowers have green sepals and petals and a white lip.

ERIA, Lindl.

Eria (§ Eriura) obliqua, *Lindl. in Journ. Linn. Soc. (Bot.)* iii. (1859) p. 55.

Hab. Singapore: Mangrove swamps, Kranji! Bukit Timah!
Johore: Batu Pahat!
Also Rhio! And Borneo, *Haviland!*

This is a small tufted plant with little white pubescent flowers, which have usually a row of pale purple spots on each lateral lobe, and a yellow spot in the centre of the mid-lobe. It was first obtained by Cuming, in Singapore.

E. (§ Eriura) major, *Ridl. ex Stapf, in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iv. (1894) p. 237, in syn. *E. Kingii*, Hook. f., Fl. Brit. Ind., v. p. 790 (non F. Muell). *E. Scortechinii*, Stapf, in Trans. Linn. Soc., *l.c.* (non Hook. f.).

Hab. Perak: Maxwell's Hill! to the top of the range.

A tall tufted plant. Flowers greenish yellow, the lip white, lateral lobes spreading spotted pink, mid-lobe deep maroon purple, with a pulverulent white callus almost covering the disc. There is also a pulverulent white callus at the base of the lip. Column white, edged reddish purple.

The name *E. Kingii* (Hook. f., l.c.) was used previously by F. von Mueller for an Australian species, and Dr. Stapf, in the paper on the flora of Kinabalu (Trans. Linn. Soc., l.c.), substituted the name *E. Scortechinii* for it, overlooking the fact that that name also was pre-occupied. I had described the Bornean plant as a variety under the name *E. Kingii*, "*var. major*," accidentally printed *E. major*, Ridl., which thus becomes the oldest specific name.

ERIA (§ ERIURA) BIDENS, *Ridl., sp. nova.* *Caules* 12 poll. longi, validi, crassi, subcompressi, plures undique foliati. *Folia* 9–18 poll. longa, 1½ poll. lata, articulata, læte viridia, disticha, subcoriacea, graminea, acuta, inæqualiter biloba, suberecta vel longiora nutantia. *Scapi* 3, in axillis terminalibus erecti, ultra pedem longi, lanuginosi, præter bracteas paucas basales ovatas acutas nudi. *Flores* parvi, copiosi, dissiti; bracteæ erectæ. pedicellis appressæ. *Sepalum* posticum ⅛ poll. longum, ovatum obtusum, lateralia multo majora ovata obliqua late explanata, omnia in dorso pubescentia pallide purpurascentia, in paginis interioribus glabra, virescentia atro-kermesino-maculata, apice obscuriora. *Petala* sepalo postico multo minora, lineari-oblonga obtusa, rosacea. *Labellum* ¼ poll. longum, pallide flavum in disco angusto albo-farinosum; lobi laterales lati obtusi rotundati pallide flavi in marginibus rubro-punctati, in medio a carinis 2 rubris carinati, medius bifidus laciniis linearibus albis. *Columna* gracilis, recta, alba kermesino-marginata; clinandrium profundum, late ellipticum. *Anthera* plana, ferme bilocularis; pollinia 8, pyriformia, pallide flava; rostellum breve, linguæforme.

Hab. Perak: Maxwell's Hill, Larut Hills! Alt. 2–4,000 feet. —Java.

I should have taken this for *E. iridifolia*, Hook. f., except for the description of the terminal lobe of the lip, which is described and figured as concave and rounded, instead of being bifid. It is a very large stout plant, with the habit somewhat of *Dipidium* *paludosum*, Reichb. f., except that it does not emit roots from the upper part of the stem.

ERIA (§ ERIURA) IRIDIFOLIA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 790, *Ic. Pl.*, t. 2067.

Hab. Perak: Gunong Batu Putih, *Wray*.

E. (§ ERIURA) LONGIFOLIA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 790, *Ic. Pl.*, t. 2068.

Hab. Perak: Maxwell's Hill, Gunong Hijan, Larut Hills! to 5,000 feet alt.
Ulu Batang Padang, *Wray*.

The flowers are entirely pure white. The lip in my specimens, when the flowers are fully developed, is narrower at the base, and longer in proportion to the rest of the perianth than in the figure. There are two little oblique ridges, one on each side in the broadest part. In one rather small form the flowers are arranged in whorls on the raceme, but they are not fully expanded.

E. (§ HYMENERIA) FLORIBUNDA, *Lindl.*, *Bot. Reg.* (1843) *Misc.*, p. 43 (1844), t. 20, *et in Wall. List*, n. 7408.

Hab. Singapore: Common in mangrove swamps; Kranji! Sungei Morai! Sungei Buloh, &c.!
Johore: Tana Runto!
Selangor: Seppan!
Perak: Gunong Hijan, Larut Hills!
Kedah: Kedah Peak!

The leaves in this species vary very much in size and form from linear-lanceolate to oblong-lanceolate, and the amount of pink colouring in the sepals and petals, which are usually nearly pure white, also varies considerably. It is, however, I believe, very distinct from the next species, which seems to have been confused with it. It was first collected by Cuming, in Singapore.

E. (§ HYMENERIA) DENSA, *Ridl. in Journ. Linn. Soc.* (*Bot.*) xxxi. (1896) p. 281.

Hab. Perak: Common in the Larut Hills at about 4,000 feet or lower. Maxwell's Hill! Hermitage Hill!
Kedah: Kedah Peak!

This is a much stouter plant than *E. floribunda*, Lindl., and much more showy. The flowers are usually quite white, but

I have seen a form with dull purplish flowers on the top of the Larut Hills. *E. floribunda*, Lindl., and *E. densa*, Ridl., have a habit, common to some other orchids, of absolutely synchronous flowering. All plants of the same species blossom exactly on the same day; and it is curious that, nearly allied as these two species are, they have different days for flowering.

ERIA (§ HYMENERIA) CEPIFOLIA, *Ridl. in Journ. Linn. Soc.* (*Bot.*) xxxi. (1896) p. 282.

Hab. Perak: *Scortechini* (Drawing 140).

There is a sketch of this species among Scortechini's drawings, without locality. I have never seen it in the peninsula, knowing it only from Borneo.

E. (§ HYMENERIA) MAINGAYI, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 798.

Hab. Penang: Government Hill, *Maingay*.

This has not, so far as I know, been met with since Maingay collected it.

E. (§ HYMENERIA) SACCIFERA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 797.

Hab. Perak: Gunong Batu Putih, *Wray*.
Pahang: Tahan River?

I am doubtful about the Pahang plant, as it is only in fruit.

E. (§ HYMENERIA) TENUIFLORA, *Ridl.*, *sp. nova. Rhizoma* crassiusculum; pseudo-bulbi 6–8 poll. longi, ¼ poll. crassi, approximati, teretes, subflexuosi; vaginæ paucæ, tenues. *Folia* 3, 3–4 poll. longa, ¾ poll. lata, lanceolata acuta, tenuia, striata, carinata, apice inæqualiter biloba. *Racemi* 3–4, 5 poll. longi, graciles, undique floriferi, infra folia e basibus internodorum orti. *Flores* tenues, copiosi, flavi, glabri; pedicelli ¼ poll. longi, tenues; bracteæ ⅛ poll. longæ, ovato-lanceolatæ, reflexæ. *Sepala* ¼ poll. longa, lanceolata acuta; mentum nullum. *Petala* sepalis breviora, subsimilia. *Labellum* petalis brevius, lanceolatum acutum, integrum, flavum a maculâ medianâ purpureâ maculatum. *Columna* brevis; stelidia rotundata, inversa, stigma transversum partim celantia. *Anthera* oblonga, margine antico truncato.

Hab. Singapore: Sungei Morai! Toas!
Johore: Batu Pahat!
Perak: Hermitage Hill, *C. Curtis*.
Pahang: Pekan!

This grows on trees, often low down. It seems to be most nearly allied to *E. polystachya*, A. Rich., but is quite glabrous, and the racemes are produced from below the leaves. The flowers are of a remarkably thin texture, very troublesome to examine after drying.

ERIA (§ HYMENERIA) DISSITIFLORA, *Ridl.*, *sp. nova.* *Rhizoma* crassi. *Caules* 4 poll. crassi, a vaginis magnis tecti. *Folia* 2, subterminalia; petiolus ultra poll. longus; lamina 6 poll. longa, 1 poll. lata, oblanceolata subacuta. *Racemi* 2, breves, graciles, c. 6-flori, ex axillis vaginarum superiorum orti; rhachis gracilis, pubescens. *Flores* sessiles, parvi, dissiti; bracteæ $\frac{1}{8}$ poll. longæ, ovatæ. *Sepalum* posticum ferme $\frac{1}{8}$ poll. longum, ellipticum aut ovatum, apice obtusum cucullatum, lateralia multo latiora ovata falcata apice obtusa cucullata, omnia parce pubescentia; mentum brevissimum. *Petala* sepalo postico subsimilia, subæqualia. *Labellum* 3-lobum; lobi laterales majusculi falcati apice obtusi minute papillosi subcarnosi (callis majusculis oblongis carnosis in utroque latere disci in lateribus loborum sitis), medius longior ovatus. *Columna* longiuscula; pes gracilis, curvus. *Anthera* calvariiformis; caudiculus longus; clinandrium profundum, marginibus tenuibus elevatis. *Rostellum* tenue, latum, retusum.

Hab. Johore: Batu Pahat! (*Native collector*, v.s.)

I have only seen one specimen of this, and that dried. It belongs to the section with a stout stem covered with large sheaths, from the axils of which the racemes arise. The few distant flowers, and the distinctly three-lobed lip, and very short mentum, are peculiar.

E. (§ HYMENERIA) SUAVEOLENS, *Ridl.*, *sp. nova.* *Pseudo-bulbi* 4 poll. longi, $1\frac{1}{4}$ poll. crassi, oblongi, usque ad 6-nodi. *Folia* 3–4, inæqualia, coriacea, atroviridia; petiolus 1 poll. longus, canaliculatus; lamina 6 poll. longa $1\frac{1}{4}$ poll. lata, lanceolata, obtusa, multinervis. *Racemus* 7 poll. longus, recurvus, crassus, multiflorus, ex internodo sub folio imo sito ortus; rhachis crassa, virescenti-alba, a lanugine atro parco tecta; bracteæ $\frac{1}{4}$ poll. longæ, oblongæ acutæ, reflexæ, persistentes. *Flores* mediocres; pedicelli $\frac{1}{4}$ poll. longi, rufi, parce atro-lanuginosi. *Sepala* ovata, $\frac{3}{4}$ poll. longa, posticum obtusum; mentum oblongum, compressum. *Petala* sepalo postico subæqualia, ovata, acuta; sepala petala alba rufo-tincta. *Labelli* unguis longus, canaliculatus; lobi laterales rotundati, obtusi, erecti, rufescentes; epichilum breve, late ovatum carnosum, caruncula flava in disco sita. *Columna* breviuscula, rufescens; rostellum dentiforme, longiusculum; pes longiusculus, canaliculatus. *Stigma* reniforme.

Hab. Johore: Sedili River (*E. Almeida*, July, 1894!).

This is allied to *E. acervata*, Lindl., but has large, stout, sausage-shaped pseudo-bulbs, and larger, broad, coriaceous leaves. The raceme is stout, and recalls that of some *Saccolabium* rhachis; the pedicels and backs of sepals are sprinkled over with a little blackish pubescence. The bracts are large, but not as large as those of *E. acervata*, Lindl. The flowers are whitish, tinted with dull reddish, and sweet scented. The lip has a narrow claw full of nectar, grooved, and the sides of the grooves end in short processes. The lateral lobes are dull reddish, and on the lamina of the lip, which is very fleshy, is a raised caruncaulated mass of a lemon-yellow colour.

On the raceme I found one flower with one petal much reduced and adnate to the dorsal sepal; and another small flower with no petals nor column, a ridge on the dorsal sepal probably representing the latter.

ERIA (§ HYMENERIA) BRACTESCENS, *Lindl.*, *Bot. Reg.* (1841) *Misc.*, p. 18.

Hab. Singapore: Chan Chu Kang! Pulau Tekong! Pulau Selitar!
Johore: Batu Pahat!
Pahang: Praman, at Pekan!
Lankawi Islands: *C. Curtis!*
Kedah: On Pulau Song Song, an island lying off the Kedah Coast, north of Penang!
Also Borneo! And Tenasserim.

This species grows in open country, usually low down on trees, and often near the sea.

E. (§ HYMENERIA) RECURVATA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 797, *Ic. Pl.*, t. 2070.

Hab. Perak: *Kunstler.*

E. (§ HYMENERIA) LATIBRACTEATA, *Ridl.*, *sp. nova.* *Caules* 12 poll. longi, ¼ poll. crassi, plures congesti, teretes basi paullo incrassati, primo a vaginis tenuibus papyraceis griseis tecti, mox his decidius olivaceo-virides striolati; radices copiosæ. *Folia* 4, subterminalia, usque ad 7 poll. longa, $1\frac{3}{4}$ poll. lata, lanceolata acuta, tenuia, plicata, elevatim 4-nervia, atroviridia, carinata, canaliculata. *Racemi* 2–3, ferme 2 poll. longi, laterales, sessiles, capituliformes; bracteæ $\frac{1}{2}$ poll. longæ, ovatæ, acutæ vel subobtusæ, prasinæ. *Flores* usque ad 12, ferme $\frac{1}{2}$ poll. longi, ferme glabri; pedicelli cum ovariis $\frac{1}{4}$ poll. longi, canaliculati, torti, pubescentes. *Sepalum* posticum lanceolatum acutum, lateralia falcata carinata, omnia alba basi rubro-striata; mentum breve, latum, obtusum. *Petala* sepalis breviora latiora, obtusa, basi angustata, alba. *Labellum* sepalis brevius, curvum; lobi laterales falcati obtusi rubri a carinis 2 elevatis curvis rubro-marginatis (et inter has a nervis 2 elevatis) percursi, medius lateralibus longior late ovatus retusus albus; discus basi elevatus, rotundatus, bruneo-rubro-maculatus. *Columna* longiuscula, lata, alba; pes vix longior, ruber. *Anthera* conico-calvariiformis, in dorso incrassata; loculorum parietes 4 tenues, partim iterum subdivisi. *Clinandrium* profundum; stelidia erecta; rostellum breve. *Stigma* longum, oblongum; crura conspicua.

Hab. Sungei Ujong, *Dr. Braddon*, May, 1894.

Rather a pretty plant, the large apple-green bracts setting off the white and madder coloured flowers. The habit is that of *E. floribunda*, Lindl., but the affinity appears rather to be with the *E. acervata*, Lindl., and *E. recurvata*, Hook. f.

ERIA (§ HYMENERIA) PUDICA, *Ridl.*, *sp. nova.* *Pseudo-bulbi* $1\frac{1}{2}$ poll. longi, $\frac{1}{2}$ poll. crassi, congesti, cylindrici, plurinodi, a vaginis chartaceis bruneis (summâ 1 poll. longâ, lanceolatâ acutâ) tecti. *Folia* 6 poll. longa, $1\frac{3}{4}$ poll. lata, oblanceolata subacuta, basi longe attenuata, coriacea. *Racemi* 2 poll. longi, erecti, e nodis inferioribus orti, in dimidiâ parte nudi. *Flores* plures, congesti, iis *E. floribundæ* æquales; bracteæ cum $\frac{1}{3}$ parte ovarii æquilongæ, ovatæ. *Ovarium* cum pedicello vix $\frac{1}{8}$ poll. longum, albo-romentosum. *Sepalum* posticum ellipticum obtusum extra pubescens, lateralia multo majora ovata. *Petala* cum sepalo postico æquilonga, elliptica falcatula obtusa, glabra; sepala petala alba. *Labellum* oblongum; lobi laterales breves falcati subacuti in margine violacei, medius major late oblongus truncatus; calli 2, majusculi, oblongi, plani, roseo-marginati, inter lobos laterales siti; lobi medii discus a maculâ roseâ ornatus. *Columna* longiuscula, lata. *Anthera* rotundata, in margine emarginata; rostellum ovatum. *Stigma* grande, reniforme.

Hab. Singapore: Changi!
Johore: Batu Pahat! Kwala Kahang!

A small, compact plant, with short racemes of white flowers.

ERIA (§ HYMENERIA) ENDYMION, *Ridl., sp. nova.* *Pseudo-bulbi* (juvenes) 3 poll. longi, crassi, congesti, 2–3-nodi, conico-cylindrici; vaginæ elongatæ, lanceolatæ, acutæ, summa (longissima) 3 poll. longa, 1 poll. lata. *Folia* 8 poll. longa, 1½ poll. lata, lanceolata, subacuta, basi attenuata, coriacea. *Racemi* 6 poll. longi, erecti, validi, basi (c. triente) nudi. *Flores* ½ poll. in diam., plures, resupinati; pedicelli crassiusculi, pubescentes; bracteæ cum ½ parte pedicelli æquilongæ, lanceolatæ. *Sepala* alba, extra pubescentia, posticum late lanceolatum, subobtusum, lateralia late ovata acuta falcata; mentum breve, latum, obtusum. *Petala* ovata, glabra, alba. *Labellum* 3-lobum; lobi laterales falcati, acuti, bruneo-rosei, in medio canaliculati, in margine interiore elevato laminæformi albi; lobus medius ovatus, obtusus, albescenti-flavus, a disco calloso carnoso ornatus. *Columna* recta, in ventre flava; clinandrium profundum. *Anthera* pileata, depressa; pollinia subæqualia, pyriformia, aurantiaca. *Stigma* transversim ellipticum.

Hab. Singapore: Selitar!

This has been cultivated for several years in the Botanic Gardens, but its habitat was not known. A plant, however, was brought in from the Selitar jungle recently; I am told also it is a native of Borneo. It is a very pretty species, with stout racemes of pure white flowers, relieved by the madder-red lobes of the lip. The inner sides of the lateral lobes are produced into flat laminas, which nearly meet in the middle line, leaving only a channel between them.

E. (§ AËRIDOSTACHYA) AËRIDOSTACHYA, *Reichb. f., ex Lindl. in Journ. Linn. Soc. (Bot.)* iii. (1859) p. 48.

Hab. Johore: Tanah Runto!
Malacca: loc. incert.!
Perak: Larut Hills (*King's Collector*).

I presume that I am correct in this, as I have a copy of an excellent drawing by Scortechini which exactly represents the Johore and Malacca plant, and is labelled "*E. acridostachya*,"

but I am quite unable to reconcile it with the description in the 'Flora of British India.' In the description of the section the pseudo-bulb is said to be one-leaved instead of two or more, and the scape rises from the base of the pseudo-bulbs instead of from the axil of one of the uppermost sheaths.

In the specific description the lip is described as "Coriaceous . . . . side lobes very small." In my specimens it is rather thin in texture, and I can see no trace of any side lobes. The apex is rather fleshier than the base, and I imagine that this fleshier portion represents the epichil.

The capsule is $\frac{1}{4}$ inch long, elliptic, splitting into its component costæ when ripe, so that they are quite separate except at the ends, where they are held together by the withered perianth.

ERIA (§ AËRIDOSTACHYA) DASYSTACHYS, *Ridl., sp. nova.* *Rhizoma* crassum, lignosum. *Pseudo-bulbi* 3 poll. longi, crassi, validi, conico-cylindrici, a vaginis chartaceis tecti. *Folia* usque ad 4, 8 poll. longa, 1 poll. lata, oblanceolata, in petiolos attenuata, haud coriacea. *Racemi* 2, in axillis foliorum inferiorum orti, 4–5 poll. longi, erecti, basi longe nudi ferrugineo-tomentosi; bracteæ c. 7, dissitæ, ovatæ; pars florifera 2 poll. longa. *Flores* dense congesti, resupinati, ferrugineo-tomentosi; bracteæ $\frac{1}{4}$ poll. longæ, cum ovariis æquilongæ vel paullo longiores, ovato-lanceolatæ subacutæ. *Sepala* ovata, acuta; mentum crassum, obtusum, ferrugineo-tomentosum. *Petala* sepalis breviora, linearia acuminata, subobtusa, glabra. *Labellum* tenue; unguis linearis, in marginibus incrassatus: lobi laterales breves, rotundati, crispi, medius ovatus obtusus crispus. *Columna* crassiuscula. *Anthera* tenuis, complanata, apice retusa, in margine emarginata; rostellum majusculum.

Hab. Pahang: Kwala Pahang, on a low tree!

This species in its dense spike of rusty pubescent flowers resembles *E. aëridostachya*, Reichb. f., but the pseudo-bulb is not covered with the persistent sheaths but with their decayed papery ones. There are four leaves, and the inflorescences spring from the axils of the two lower ones and not from the axils of sheaths.

E. (§ AËRIDOSTACHYA) LORIFOLIA, *Ridl., sp. nova.* *Rhizoma* ferme 1 poll. crassum, lignosum. *Caules* 1 poll. longi, crassi, a vaginis magnis (summâ fere 5 poll. longâ) chartaceis tecti.

Folia 15 poll. longa, 1–1¼ poll. lata, lorata, acuta, coriacea. *Racemi* cum foliis æquilongi vel longiores, basi longe nudi, glabri; pars florifera 6 poll. longa; rhachis stellatim pubescens. *Flores* parvi, plurimi, dissiti. *Bracteæ* minutæ, ovatæ; pedicelli cum ovariis ¼ poll. longi, pubescentes. *Sepala* extra parce rufo-pubescentia, posticum breve ovatum lateralia brevia late ovata; mentum longum, pendulum, clavatum. *Petala* sepalo postico latiora, late ovata, tenuiora, glabra. *Labellum* sepalis brevius, oblongum, basi angustum; lobi laterales brevissimi medius multo major oblongus obtusissimus in margine undulatus. *Columna* brevissima; pes longus, canaliculatus, in margine incrassatus; clinandrium vix profundum; rostellum tenue. *Stigma* cordatum, in margine elevatum.

Hab. Kedah: Kedah Peak, on trees at 4,000 feet alt.!

A very stout plant, with long thick leaves. The rhizome is remarkably thick and woody. The flowers are nearly ¼ inch long, brown. It is distinguished from *E. aëridostachya*, Reichb. f., by its more linear leaves, tall glabrous peduncle, laxer flowers, and distinctly trilobed lip.

Eria (§ Aëridostachya) brunea, *Ridl., sp. nova.* *Folia* 9 poll. longa, ¾ poll. lata, anguste lanceolata acuta, basi longe attenuata, coriacea. *Racemi* ex axillis superioribus orti; pedunculus 5–6 poll. longus, a tomento ferrugineo tectus; pars superior 3–6 poll. longa, nutans, a floribus copiosis dense congestis ornata. *Bracteæ* minimæ, ovatæ acutæ, ferrugineo-tomentosæ. *Flores* parvi, brunei; ovaria cum pedicellis $\frac{3}{16}$ poll. longa, ferrugineo-tomentosa. *Sepala* extra a tomento rufo stellato parce tecta, posticum parvum ellipticum obtusum lateralia multo latiora ovata obliqua; mentum longum, pendulum. *Petala* linearia, obtusa, curva. *Labellum* tenue; unguis longus, angustus; lamina ovata, spathulata, in margine undulata. *Columna* brevis, lata; pes longus; clinandrium profundum, marginibus tenuibus; rostellum tenuius, integrum. *Stigma* grande, ovatum.

Hab. Perak: Hermitage Hill, *C. Curtis!*

Near *E. aëridostachya*, Reichb. f., but with smaller flowers and thin spathulate lip. The raceme is very compact; the flowers open wide, and are of a light-brownish colour. The narrow petals are peculiar for the section.

E. (§ Bambusifoliæ) minutiflora, *Ridl., i.e., Agrostophyllum* *pauciflorum*, Hook. f., Fl. Brit. Ind., v. p. 824, et Ic. Pl., t. 2097. *Caules* 2 ped. longi, pauci, elongati, graciles. *Folia* 2 poll. longa, $\frac{1}{8}$ poll. lata, plura, linearia, obtusa, inæqualiter biloba; vaginæ $\frac{1}{2}$ poll. longæ, profunde fissæ. *Racemi* laterales, breves, e vaginis vix exserti, pauciflori, prope ad folii laminam approximati; bracteæ cum $\frac{1}{2}$ parte pedicelli æquilongæ, ovatæ, acuminatæ. *Flores* minuti, albi. *Sepala* lanceolata, acuminata, acuta, carinata, lateralia basi connata mentum breve formantia. *Petala* sepalis breviora, linearia, obtusa. *Labelli* unguis columnæ pedi adnatus: lamina sepalis longior, porrecta, spathulata, basi angusta, canaliculata, in marginibus elevata, apice ovata acuta; linea incrassata carnosa in disco sita. *Columna* brevis, crassa; stelidia longa, acuta, suberecta. *Anthera* ovata, apice incrassata, antice rostrata; pollinia 4, subæqualia, ovoidea.

Hab. Johore: Batu Pahat!
Pahang: Tahan River Woods!
Perak: *Scortechini.*

A weak plant, with the habit of some of the Appendiculas, growing on trees. The racemes are very short, and protruded from the leaf-sheaths close to the leaf-blade. There are four or five flowers rather distant on each raceme. The sepals are keeled, and the laterals are connate along the edge at the base beneath the lip. The column-foot is adnate by its edges to the claw of the lip. The stelidia are rather broad; they have a thin edge ending in an obscure tooth, and a fleshier outer portion ending in a longer point.

It is difficult to refer this plant to any genus. In habit, pollinia, short column, it is very distinct from *Agrostophyllum*, to which Sir Joseph Hooker has referred it. *Glomera*, with four pollen-masses instead of eight, has so much the habit and form of lip and column of *Agrostophyllum* that I think its affinities can hardly lie there.

On the other hand, in many respects it resembles *Eria*, and I think should be classed there.

I have re-described it because the materials for the original description being insufficient, the account and figure differed somewhat from the specimens I have collected. Fig. 2 of the Icones from Scortechini's drawings by no means gives a correct idea of the column and lip; the claw of the latter is very much narrower, and the base, which is parallel to the column-foot, is also adnate to it, and the blade stands at an angle with it.

The conical portion at the end was intended evidently to represent the upturned side of the broad ovate portion. I see nothing like the process on the side of the column below the stelidia.

There being already an *Eria pauciflora*, I have been unable to use this specific name in transferring the species to the genus *Eria*.

ERIA (§ BAMBUSIFOLIÆ) PILIFERA, *Ridl.*, *sp. nova.* *Caules* 1½ ped. longi, debiles, subteretes. *Folia* 2½ poll. longa, ½ poll. lata, lanceolata acuminata, tenuia, pallide viridia, apice inæqualiter biloba, lobo altero ¼ longiore acuto; vaginæ ferme 1 poll. longæ, ore integræ. *Racemi* brevissimi, pauciflori. *Flores* parvi, tenues, singulatim expansi. *Bracteæ* ⅛ poll. longæ, lanceolatæ, patentes, persistentes, pubescentes, pallide flavæ. *Ovarium* cum pedicello ⅜ poll. longum, tortum, parce pubescens, flavum. *Sepala* ⅜ poll. longa, oblongo-lanceolata, obtusa, tenuia, alba, lateralia falcata, magis acuta; mentum cum ⅓ parte sepali subæquilongum, obtusum. *Petala* cum sepalis æquilonga, lanceolata, subobtusa. *Labellum* petalis brevius, angustum, cuneatum; lobi laterales apice rotundati, medius lateralibus vix longior crassus subtrilobus a pilis brevibus flavis tectus. *Columna* curva, basi angustata, superne incrassata, alba. *Anthera* brevis, rotundata, albescenti-ochracea, bilocularis; pollinia 8, admodum inæqualia. *Stigma* profundum, transverse ovatum; rostellum linguæforme, obtusum, decurvum; stelidia dentiformia, incurva. *Capsula* (immatura) 2 poll. longa, teres.

Hab. Perak: Maxwell's Hill! On trees in thick jungle.

A slender, leafy-stemmed plant, with thin textured white flowers, which are produced singly in racemes bearing four yellow empty bracts beneath the flower. The lip has the apex covered with mealy yellow hairs like those of *Dendrobium criniferum*, Lindl. The column has two small tooth-like processes which curve in over the large stigma. The pollinia are remarkably unequal, the upper four being four times as large as the others. The capsule splits for its whole length along one side only. It belongs apparently to the section *Bambusifoliæ*.

The next four species form a good sub-section of *Nutantes*, distinguished by a tall somewhat terete (*i.e.*, not pseudobulbous stem), bearing a few leaves at the top, and short racemes below these, with one or more fairly large glabrous flowers with large usually ochreous bracts.

ERIA (§ NUTANTES) LEPTOCARPA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 805.

Hab. Perak: *Scortechini!*

I have only seen this from Borneo.

E. (§ NUTANTES) NUTANS, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 83.

Hab. Singapore: common; Selitar! Toa! Kranji!
Johore: Tana Runto! Limpai, Khi Batu Pahat! *Lake and Kelsall*, Gunong Panti (2,000 ped. alt.).
Malacca: Mt. Ophir!
Penang: Government Hill!
Perak: *Scortechini.*
Kedah: Kedah Peak!

This is a common mangrove swamp species; but I have also met with it in the higher parts of several hills of the interior.

The flowers are usually pure white, except for a little pink on the mentum and lip, and some yellow also on the latter. At the base of the foot of the column is a large square cushion (pulvinus) of an orange-red colour. I have also, however, seen a form in damp hill woods, in which the sepals and petals are coloured a dirty pink.

E. (§ NUTANTES) NEGLECTA, *Ridl. in Journ. Linn. Soc. (Bot.)*. xxxi. (1896) p. 283.

Hab. Singapore: Kranji! Selitar! Sungei Buluh!
Johore: Tana Runto!
Also Borneo.

It is sometimes difficult to tell dried specimens of this from *E. nutans*, Lindl., but it is very distinct when alive. It forms often quite a mat of rhizomes on the branches of the trees in the mangrove swamps. The flowers are of a dull flesh colour, with the yellow on the lip as in *E. nutans*, Lindl.

The figure in Scortechini's drawings alluded to by Hook. f., Fl. Brit. Ind., v. p. 800, is evidently intended for this species.

E. (§ NUTANTES) LONGE-REPENS, *Ridl. in Journ. Linn. Soc. (Bot.)* xxxi. (1896) p. 282.

Hab. Singapore: Sungei Morai.

This very curious plant creeps on the ground and ascends small trees in thick dry woods, much after the manner of *Claderia.* I have only met it in this one spot in the Malay Peninsula, but it is abundant there, and occurs also in Borneo.

ERIA (§ DENDROLIRION) ALBIDO-TOMENTOSA, *Lindl., Gen. et Sp. Orch.*, p. 66. *Rhizoma* longe repens. *Pseudo-bulbi* 2 poll. longi, ovoidei, compressi, remoti. *Folia* 3, 5 poll. longa, 1½ poll. lata, lanceolata, basi attenuata. *Scapus* 6 poll. longus, lateralis, lanuginosus, c. 10 florus, basi a vaginis pluribus lanceolatis obtusis tectus. *Flores* mediocres, explanati. *Bracteæ* lanceolatæ acuminatæ, bruneæ, lanuginosæ. *Sepala* reflexa, extra albo-lanuginosa, intus glabra, viridia, posticum lanceolatum acutum, lateralia late triangularia lanceolata acuta, basi rubro-maculata. *Petala* cum ½ parte sepali æquilonga, lineari-lanceolata, acuta, basi angustata, recurva, viridia. *Labellum* panduratum; lobi laterales breves oblongi obtusi, medius late oblongus obtusissimus, viridis dense purpureo-maculatus et punctatus, apice acutus flavus; callus elevatus; macula brevis glabra atropurpurea inter brachia sita. *Columna* longa, gracilis, alba; macula rosea in pede sita; stelidia brevia, obtusa, rotundata. *Anthera* obtusa, conica, brunea. *Dendrobium albido-tomensum*, Blume, Bijdr., p. 345.

Hab. Lankawi Islands: *C. Curtis!* v.v.
Tonka: Native dealers.
Java! There is a good sketch of this among Zollinger's drawings at Buitenzorg.

The descriptions of this species are either inadequate to determine it by, or are somewhat different from the plant which I take to be intended. The figure in Reichenbach's 'Xenia Orchidacea,' ii. t. 136, taken from one of Kuhl and Hasselt's drawings, is a remarkably bad one, and, indeed, hardly recognisable. The flowers are so thickly covered with white wool on the backs that the ground colour of the sepals cannot be seen; in front, however, they are of a sea-green. The lip is also green, but for the greater part so thickly spotted and blotched with purple that it appears all purple at first sight. In the middle of the lip is a raised V-shaped ridge, which is yellow, and in the fork is a raised, polished, dark purple spot. The column is very long for the genus.

I found a plant closely resembling this on Kedah Peak, but flowerless.

ERIA (§ DENDROLIRION) ORNATA, *Lindl.*, *Gen. et Sp. Orch.*, p. 66 ? . *Rhizoma* gracile, ramosum; radices tenaces, teretes. *Pseudo-bulbi* $1\frac{1}{2}$–2 poll. longi, $\frac{1}{2}$–$\frac{3}{4}$ poll. lati, $\frac{1}{4}$–$\frac{3}{8}$ poll. crassi, oblongi, compressi, 4-nodi, inter se 2–$2\frac{1}{2}$ poll. remoti. *Folia* 2–3, 6 poll. longa, 1 poll. lata, lanceolata acuta, apice inæqualiter biloba, coriacea, læte virentia sæpe rubromarginata. *Scapus* 1 ped. longus, lateralis, basi nudus, superne laxe racemosus; bracteæ $1\frac{1}{2}$ poll. longæ, ovatæ vel lanceolatæ, acutæ, glabræ, aurantiaco-rubræ. *Flores* 12–20; ovaria cum pedicellis $1\frac{1}{2}$ poll. longa, brunea, pubescentia. *Sepala* basi brunea apice flavescenti-alba, extra pubescentia intus glabra flavescenti-alba, posticum 1 poll. longum, basi $\frac{3}{16}$ poll. latum lineari-lanceolatum obtusum apice incrassatum, lateralia subsimilia; mentum $\frac{1}{4}$ poll. longum, late scrotiforme. *Petala* sepalis breviora, lanceolata acuminata, alba. *Labellum* basi latum album; lobi laterales suberecti vix distincti albi in margine atrobrunei, medius anguste lanceolatus acutus, sinuatus, kermesinus; carinæ 2, in disco inter lobos laterales elevatæ. *Columna* curva, alba; pes longiusculus. *Anthera* conica, obtusa, alba. *Stigma* elongatum, oblongum. *Dendrobium ornatum*, Blume, Bijdr., p. 345 ? .

Hab. Siam: Pungah, *C. Curtis!*
Also Borneo.

This species is very distinct from the Philippine *E. armeniaca*, Lindl., Bot. Reg. (1841) Misc., p. 38, t. 42 (Cuming's Collections, Philippines, n. 2048), but it seems to have been passed over for that species. Blume's description is very incomplete (and I have not seen any specimens from Java), but as far as it goes it will suit this plant very well.

The bracts are of a beautiful apricot orange, broader at the base than those of *E. armeniaca*, Lindl., and glabrous. The sepals are dull purplish brown, and covered on the outer face with a fine white pubescence. The apices are yellowish and more fleshy. The lip is very different. The two outer nerves of the disc are raised, and developed into thin plates, the median nerve is not elevated. The epichil is narrow and acuminate. In *E. armeniaca*, Lindl., the lateral nerves are but little thickened and raised, but the median one is strongly developed, and on the broad ovate epichil bears an elliptic thick callus with a depressed centre.

E. tomentosa, Hook. f., differs in having the mid-lobe "clawed

subquadrately cordate," oblanceolate petals, and bracts hardly an inch with a broad, thickened, roughened area from the base to the apiculate tip. It is the only other species of the group known to me.

ERIA (§ DENDROLIRION) PULCHELLA, *Lindl.*, *Bot. Reg.* (1841) *Misc.*, p. 52, *et in Wall. List.*, n. 7407.

Hab. Singapore: Kranji! Pulau Tekong! Sungei Morai!
Johore: Kwala Kahang, *Lake and Kelsall!* Batu Pahat!
Malacca: Bukit Batu Tiga, *R. Derry!*
Penang: Government Hill, *C. Curtis*, rocks near Beach!
Pahang: Pulau Tiuman!
Perak: *Scortechini.*
Sungei Ujong: *N. Cantley!*
Kedah: *Kedah Peak.*
Also Rhio! And Borneo, *Haviland!*

A very common plant growing often high up on branches of trees, often creeping over rocks by the sea or on the rivers. It is called "*Parâ Chinduai*" and "*Sakat Bigus*," by the Malays of Sungei Ujong.

The flowers are of a buff yellow, the lip has a white claw with a central purple spot, and three purple bars ending in a purple blotch on the lamina. The lip is not "mobile" in any plants which I have seen, as described by Blume.

E. (§ DENDROLIRION) PANNEA, *Lindl.*, *Bot. Reg.* (1842) *Misc.*, p. 64.

Hab. Singapore: Kranji! Chan Chu Kang!
Johore: Batu Pahat! Tana Runto!
Malacca: Merliman! Sungei Bahra, *R. Derry*, Mt. Ophir!
Perak: *Scortechini.*

This is called in Malacca "*Poko Kura Kubong*," and the leaves and roots are boiled and the decoction used for bathing by the aborigines (Jakuns) in cases of shivering fever. It is a common little plant creeping on branches of trees often very high up.

E. (§ DENDROLIRION) PELLIPES, *Reichb. f.*, *ex Hook. f.*, *Fl. Brit. Ind.*, v. p. 802.

Hab. Malacca: On trees on Mt. Ophir, common!
Perak: Thaiping Hills, 5,000 feet!
Penang: Government Hill!
Also Borneo!

A curious little plant creeping on trees usually at about 2,000 feet elevation. From the shape of the leaves resembling elephants' tusks, the Malays on Mt. Ophir called it "*Angrek Gading*" ("Ivory Orchid").

ERIA (§ DENDROLIRION) LEIOPHYLLA, *Lindl. in Journ. Linn. Soc.* (*Bot.*) iii. (1859) p. 57.

Hab. Penang: Top of Government Hill, *Curtis!*

E. (§ DENDROLIRION) LANCIFOLIA, *Hook. f., Fl. Brit. Ind.*, v. p. 804.

Hab. Perak: At low elevation (*King's Collector*).

E. (§ DENDROLIRION) STELLATA, *Lindl. Bot. Reg.*, t. 904; *et in Bot. Mag.*, t. 3605.

Hab. Singapore: Choa Chu Kang!
Pahang: Limestone rocks at Kota Glanggi!

Apparently common in Borneo and Sumatra, whence (from Djambi) I have received very fine forms.

E. (§ DENDROLIRION) STRIOLATA, *Reichb. f. in Illustr. Hortic.* (1888) p. 35, t. 48.

Hab. Singapore: Kranji!
Johore: Batu Pahat!
Common in Borneo.

E. (§ DENDROLIRION) ELATA, *Hook. f., Ic. Pl.*, t. 1848, *Fl. Brit. Ind.*, v. p. 994.

Hab. Perak: *Scortechini.*

E. (§ TRICHOTOSIA) VESTITA, *Lindl., Bot. Reg.* (1844) *Misc.*, p. 76 (1845), t. 2.

Hab. Singapore: Sungei Brih! Kranji! Sungei Morai!
Malacca: Merliman! Mt. Ophir!
Pahang: Pekan!
Perak: *Scortechini.*
Selangor: Seppan!

The finest species in the section, growing on trees in damp spots often low down.

Eria (§ Trichotosia) ferox, *Blume, Mus. Bot. Lugd. Bat.*, ii. p. 184.

Hab. Penang: *Lobb, Maingay.*
Perak: Gunong Hijan, Larut Hills, 4,500 feet on trees!
Kedah: Kedah Peak, alt. 4,000 feet, on rocks and trees!

A tall tufted plant, with numerous greenish yellow flowers. Sometimes epiphytic, at other times terrestrial.

E. (§ Trichotosia) monticola, *Hook. f., Fl. Brit. Ind.*, v. p. 806.

Hab. Pulau Aor (an island east of Johore), *J. Feilding!*
Malacca: Mt. Ophir!
Selangor: Bukit Hitam, *Kelsall!*
Perak: *Scortechini.*

E. (§ Trichotosia) gracilis, *Hook. f., Fl. Brit. Ind.*, v. p. 806.
Hab. Perak: *Scortechini.*

E. (§ Trichotosia) tuberosa, *Hook. f., Fl. Brit. Ind.*, v. p. 807.
Hab. Perak: Gunong Hijan, Larut Hills, 5,000 feet elevation!
Malacca: Mt. Ophir!

E. (§ Trichotosia) aporina, *Hook. f., Fl. Brit. Ind.*, v. p. 808.
Hab. Perak: Larut Hills!

E. (§ Trichotosia) poculata, *Ridl., sp. nova. Caules* 2 ped. longi, graciles, teretes, a vaginis 1½ poll. longis scabridis (laminâ carentibus) tecti. *Folia* 3 poll. longa, ½ poll. lata, lanceolata acuminata acuta, inæquilateralia, coriacea, glabra, ecarinata, ecanaliculata; vaginæ 1½ poll. longæ, in ore rotundo integro castaneo-pilosæ. *Racemi* vix ½ poll. longi, pluriflori, basi a bracteâ poculiformi castaneo-pilosâ suffulti. *Pedunculus* ¼ poll. longus, pilosus; bracteæ florales ¼ poll. longæ, cum floribus ferme æquilongæ, ovatæ, rufo-pilosæ; pedicelli vix ⅛ poll. longi, rufo-pilosi. *Sepalum* posticum ⅛ poll. longum lanceolatum subacutum flavescens extra pilosum, lateralia latiora magis acuta carinata; mentum cum sepalis æquilongum, latum, obtusum. *Petala* sepalis minora, lanceolata, acuta, tenuia, glabra, in margine minutissime denticulata. *Labellum* album, basi aurantiacum lineari-cuneatum, apice dilatatum emarginatum; latera iuvoluta; margines fimbriati. *Columna*

lata, superne incrassata, purpurea. *Anthera* subquadrata, emarginata, minute pustulosa, atropurpurea; pollinia minuta, oblonga vel cuneata, inæqualia. *Stigma* latum, reniforme; rostellun labiatum, deflexum.

Hab. Kedah: Kedah Peak! Alt. 3,000 feet; on rocks and on the ground abundant.
Flowered in Hort. Bot. Singapore, Feb., 1893!

This has the smallest flowers of any species of the section, and the plant is one of the tallest. The inflorescence bract is of the shape of a cup and quite entire. The mentum is remarkably short. The lip is small and narrow, nearly bilobed at its apex, the edges waved and fimbriate. An elevated line runs down the disc from the base, which is full of nectar.

ERIA (§ TRICHOTOSIA) OLIGANTHA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 807.

Hab. Singapore: Toas!
Penang: Government Hill, *Curtis!*
Pahang: Tahan Woods!
Perak: Hermitage Hill!

E. (§ TRICHOTOSIA) VELUTINA, *Lodd. ex Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 86.

Hab. Singapore: Sungei Morai! Kranji! Jurong!
Johore: Batu Pahat!
Malacca: Mt. Ophir!
Penang: Government Hill, *Curtis!*
Kedah: Terutan! *Curtis!*

A common plant with dull-coloured inconspicuous flowers.

E. (§ PORPAX) MEIRAX, *N. E. Br. in Gard. Chron.* (1880) II. p. 603.

I found a quantity of a plant much resembling this on rock faces on Kedah Peak, but it was out of flower.

E. (§ DILOCHIOPSIS) SCORTECHINII, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 809.

Hab. Perak: *Scortechini.*

I have not met with this.

PHREATIA, Lindl.

P. MYOSURUS, *Lindl. in Journ. Linn. Soc.* (*Bot.*) iii. (1859) p. 61.

Hab. Perak: Larut Hills, Gunong Hijan, 5,000 feet alt!

P. MINUTIFLORA, *Lindl. in Journ. Linn. Soc.* (*Bot.*) iii. (1859) p. 82.

Hab. Singapore: Kranji! Toas! Jurong! (4679.)
Johore: (*Native collector*)!
Perak: Maxwell's Hill, Larut Hills!

Rather common in the mangrove swamps in Singapore. I have also received it from Djambi, in Sumatra.

P. NANA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 811, *et Ic. Pl.*, t. 2084.
Hab. Perak: *Scortechini.*

P. LISTROPHORA, *Ridl.*, *sp. nova.* Cæspitosa; radices copiosæ. *Caules* 1 poll. longi. *Folia* 6 poll. longa, vix $\frac{1}{4}$ poll. lata, anguste lanceolata acuta, apice inæqualiter biloba, disticha, in petiolis $\frac{1}{2}$ poll. longis articulata. *Racemi* 1–2, 7–8 poll. longi, elongati, graciles, usque ad $\frac{1}{2}$ partem vel ultra nudi (vaginis apice acuminatis exceptis). *Flores* minuti, plurimi, albi, subdissiti. *Bracteæ* $\frac{1}{8}$ poll. longæ, lanceolatæ acuminatæ, pedicellos cum ovariis superantes. *Sepala* lateralia postico majora, ovata subacuta. *Petala* sepalis minora, oblongo-ovata. *Labelli* unguis linearis, lamina reniformis. *Columna* crassa. *Anthera* ovata; caudiculus latus; rostellum latum, superne bidentatum. *Stigma* maximum, oblongum. *Capsula* $\frac{3}{16}$ poll. longa, oblonga, in pedicello gracili sita.

Hab. Perak: Larut Hills, 5,000 feet alt.!
Kedah: Gunong Raya, *C. Curtis!*

A very narrow-leaved species with slender racemes of minute flowers, more distant than in *P. Myosurus*, Lindl. The lip has a narrow linear claw ending in a reniform blade. The rostellum is remarkable for being distinctly bifid.

CERATOSTYLIS, Blume.

C. GRACILIS, *Blume, Bijdr.*, p. 306; *Reichb. f.*, *Xenia Orch.*, ii. p. 92, t. 127. *C. teres*, Reichb. f. in Bonplandia, ii. (1854) p. 89; Walp. Ann., vi. 470.

Ceratostylis malaccensis, Hook. f., Fl. Brit. Ind., v. p. 825, et Ic. Pl., t. 2098.

Appendicula teres, Griff., Notul., iii. p. 359, et Ic. Pl. As. t. 332.

Hab. Malacca: Mt. Ophir, common at 2–4,000 feet!
Johore: Batu Pahat!
Selangor: Near Kwala Lumpur, in the low country!
Perak: Larut Hills, 3–4,000 feet elevation! (*Scortechini!* drawings.)
Kedah Peak: alt. 4,000 feet!
Also occurs in Assam, Khasia, Java, Sumatra.

I am quite unable to separate the Assam and Javan plants from that of the Malay Peninsula. Griffith's figure and description of *Appendicula teres*, upon which Reichenbach apparently based his *C. teres*, would very well suit the peninsular plant. Blume's *C. gracilis*, as figured and described by Reichenbach in the 'Xenia,' l.c., shows no difference. In *C. malaccensis*, Hook. f., the figure in the 'Icones Plantarum' certainly looks as if intended for a different plant, for it has a lanceolate lip, narrower at the apex than at the middle, with three distinct ridges and convex, whereas in all that I have seen the lip is broadest and thickened at the apex, concave at the base. The mentum is strictly scrotiform in my specimens. Scortechini's figures labelled *Ceratostylis malaccensis* are exactly like the plants I have collected. Perhaps the differences between the figure in the 'Icones' and the common plant are, in part at least, due to the former being drawn from dried and perhaps crushed flowers, or it may have been an exceptional form. I have received a form with very much thicker and shorter stems and leaves from Djambi, in Sumatra, the flowers, however, are quite similar, even in colouring, to the peninsular form. The plant grows, usually abundantly, on trees in the mountain districts at a considerable elevation; but I once found it on a big fallen tree in dense jungle in Kwala Lumpur, in the low country. The stems are dull, dark green. The flowers in compact tufts, two or three in each tuft opening at a time. They are usually, but not always, more or less pubescent. They do not open wide, but the apices of the perianth segments separate a little. The sepals and petals are pink, rarely yellow, the lip yellowish, with the thickened apex bright chrome yellow. The mentum and base of the lip are full of honey. There are some raised nerves in the concave part of the lip, but they are very obscure during life. The column arms are broad, long, and hooded; and the rostellum, a thin retuse membrane, is joined to them, being adnate to their interior faces. From the position of the floor of the clinandrium (*i.e.*, the rostellum) I believe that these column arms consist of the stelidia (*i.e.*, filaments of the aborted stamens) combined with a portion of the hinder margin of the clinandrium. The thin, flat anther cap is divided into eight compartments. The pollinia are eight, equal and pyriform in shape. They are joined together by a short but distinct translucent peduncle which bears at its other end an oval honey-yellow disc. This is figured also by Griffith in the 'Ic. Pl. As.,' and the presence of this was probably the reason why he referred the plant to *Appendicula*. Till I have had opportunities of examining a good series of the allied species in a living state I am unwilling to remove this plant from the neighbourhood of *Eria*, although the pollen is much more like that of a *Vandea* than that of an *Epidendrea*.

CERATOSTYLIS CLATHRATA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 825, *et Ic. Pl.*, t. 2092.

Hab. Perak: Batang Padang, 4,900 feet alt., *Wray*.

C. LANCIFOLIA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 826, *et Ic. Pl.*, t. 2102.

Hab. Perak: *Scortechini*.

C. ROBUSTA, *Hook f.*, *Fl. Brit. Ind.*, v. p. 827, *et Ic. Pl.*, t. 2103.

Hab. Perak: *Wray*.

C. CRYPTANTHA, *Ridl.*, *sp. nova.* *Caules* ½ poll. longi, cæspitosi, a vaginis siccis striatis tecti; radices copiosæ, tenues. *Folia* bina, 5 poll. longa, ⅛ poll. lata, subacuta, apice inæqualiter biloba. *Scapi* ⅜ poll. longi, filiformes, tomentosi, ex axillis vaginarum singuli, 1-flori. *Bractea* minuta, ovata; pedicellus brevis, lanuginosus. *Flos* ¼ poll. longus. *Sepala* ovata, acuta, cucullata, mucronulata, parce pubescentia; mentum longius, pendulum, clavatum. *Petala* anguste linearia. *Labellum* longum, tenue, basi lineare, apice dilatatum a callo carnoso ovato auctum. *Columna* brevis, crassa; clinandrium profundum; stelidia carnosa, antheram non superantia. *Anthera* tenuis, plana, 2-locularis, late ovata, in parte mediâ carnosa; rostellum latum, ovatum, tenue. *Stigma* parvum, laminâ oblongâ lateraliter complanata auctum. *Capsula* $\frac{1}{4}$ poll. longa, elliptica, erecta.

Hab. Perak: Maxwell's Hill, Larut Hills, on a fallen tree! Hermitage Hill! Kwala Kangsa!

This forms close tufts 2 inches across or less, with very many short stems covered with brown sheaths, each stem bearing two narrow linear leaves. The flowers are borne on slender, woolly peduncles, so short as to be almost hidden among the leaves. They are of a pale pinkish colour and very inconspicuous. The mentum of the sepals is longer than the rest of the flower, and clubbed.

The lip is long and narrow, thin textured, except at the apex, where it is fleshy and thickened, a thickened band runs from the base to this fleshy portion. The "auricles" of the column, *i.e.*, the stelidia, are shorter and less distinct than in such species as *C. malaccensis*, Hook. f., the rostellum in the form of a thin membrane with a terminal lip being well developed, and connecting them for their complete length. From the centre of the stigma rises a laterally flattened lamina which nearly touches the lip of the rostellum. A somewhat similar process occurs in *Agrostophyllum javanicum*, Blume.

The anther is thin except in the centre, where there is a thickened band which runs down to the blunt truncate beak.

The species is clearly near *C. ericæoides*, Hook. f., from which it differs, especially in the much longer mentum and lip, and much smaller flowers.

CERATOSTYLIS ERIÆOIDES, *Hook. f., Ic. Pl.*, t. 2074 B.
Eria pygmæa, Hook. f., Fl. Brit. Ind., v. p. 804.
Hab. Perak: *Wray.*

C. PENDULA, *Hook. f., Fl. Brit. Ind.*, v. p. 826.
Hab. Perak: Maxwell's Hill!
Pahang: Near Pekan, on bushes in open country!
Also Borneo, Celebes, and Manila, *Vidal!*

By no means common, though so widely distributed. A slender pendulous plant with thin woolly roots. Leaves dark green, polished above, channelled on the upper surface, convex and paler beneath. Flowers very small white, the short ovary and base of sepals covered with fine appressed white hairs, very inconspicuous when alive. Each flower is borne on a short stem with several ovate mucronulate scarious bracts a good deal longer than the ovary. Sepals ovate acute, or at least subacute, petals rather lanceolate than linear glabrous. The lip is very like that of some *Bulbophylla*, but the claw narrow and upcurved belongs to the lip. Pollinia eight, all equal and aciniform.

AGROSTOPHYLLUM, Blume.

A. MAJUS, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 824, *Ic. Pl.*, t. 2096.
Hab. Singapore: Chan Chu Kang! Kranji! Common.
Pahang: Pekan!
Perak: Larut Hills, low down!
Java: *Treub!*

A. GLUMACEUM, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 824, *et Ic. Pl.*, t. 2095.
Hab. Sungei Ujong: (*Native collector*)!
Perak: *Scortechini.*

The native name in Sungei Ujong for this is "*Sakat Bunga.*"

IPSEA, Lindl.

I. ? WRAYANA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 812.
Hab. Perak: Gunong Batu Putih, *Wray.*

SPATHOGLOTTIS, Blume.

S. PLICATA, *Blume*, *Bijdr.*, p. 401, t. 76.
Hab. Singapore: common in dry open country and also on wet rocks!
Johore: Near the town!
Sungei Ujong: Seremban!
Malacca: Sungei Hudang!
Perak: on the waterfall rocks, Thaiping!
Patani: Tomoh, Legeh, *Machado!*
Also Carimon Islands! Borneo! &c.

This is a very common plant in many districts, and very showy. There are several forms, chiefly due to local causes.

In long grass it often attains a considerable size. Mr. Hallett saw a plant over 6 feet tall in Lingga. These large forms usually have broad plicate leaves somewhat resembling those of *Curculigo recurvata*, whence the natives of Sungei Ujong call it "*Poko Lumbah Tikus*," *Lumbah* being the native name for *Curculigo*. "*Tikus*" (mouse) means that it is not so large as that plant. On damp rocks by streams it is often much smaller, with much narrower grassy leaves, but there are many intermediate forms.

A more distinct form is the variety *alba*, which has the flowers and bracts pure white; I have met with it at Pulau Sembilai, in the Dindings, also at Tjiboddas, in Java. This variety is very local, and, as far as I have seen, does not occur with the purple form.

The typical plant is not "lilac," as mentioned in the 'Flora of British India,' but of a purplish crimson: flowers and bracts being all of the same colour, except the yellow spot on the lip.

As described by H. O. Forbes ('Naturalist's Wanderings,' p. 89), the flowers are constantly self-fertilized, although they are brilliantly coloured, and are, when the blossoms first open, quite fertilizable by insects.

SPATHOGLOTTIS AUREA, *Lindl. in Journ. Hort. Soc.*, v. (1850) p. 34; *Lindl. & Paxt.*, *Flow. Gard.*, i. (1850–51) p. 16.

S. Wrayi, Hook. f., Fl. Brit. Ind., v. p. 813, et Ic. Pl., t. 2086.

Hab. Malacca: Mt. Ophir!
Perak: Larut Hills, by the tea gardens! Gunong Batu Putih, *Wray*.
Kedah: Kedah Peak!

This is common on the open "stone-fields" (Padang Batu of the Malays), on the granite hills at from 2,000 feet upwards, growing usually in spots where water trickles.

S. Wrayi, Hook. f., is merely a full-sized form of a strong plant. It invariably grows with the small form, and is the variety most sought by the orchid dealers. The flowers are often even bigger than in the figure in the 'Icones Plantarum,' and are of a richer orange than the small flowered form. The scape often attains the height of 4 feet.

S. HANDINGIANA, *Par. et Reichb. f.*, *Otia Bot. Hamb.*, p. 45.

Hab. Lankawi Islands, *C. Curtis!*

This charming little plant was first collected at Bhamo by Parish, and appears to be very rare. Mr. Curtis brought living plants down from Lankawi, where he found it growing on the rocks. The flowers are rosy purple when they first open, gradually changing to a pale rose.

PHAIUS, Lour.

P. Wallichii, *Lindl. in Wall. Pl. As. Rar.*, ii. 46 t. 158.

Hab. Malacca: Dense woods at Bukit Sadanen!

I am also told it is to be found near Kwala Lumpur, in Selangor.

Commonly the self-fertilized form.

Our form resembles *P. Blumei,* Lindl., Gen. et Sp. Orch., p. 127; Blume, Orch. Archip. Ind, 2, t. 1, in its slightly more acute and redder sepals and petals, but it is impossible to separate these specifically. What Loureiro's *P. grandifolius* can be I cannot think, but if his description is correct it must be a very striking and distinct plant. *P. Wallichii*, Lindl., is, however, often cultivated by the Chinese.

P. callosus, *Lindl., Gen. et Sp. Orch.*, p. 128, *et in Gard. Chron.* (1848) p. 287.

Hab. Perak: abundant on rocks in dense jungle, Larut Hills: fl. June!

A very fine plant, quite as showy as *P. Wallichii*, Lindl., which at first sight it resembles. I do not find the scape from the top of the pseudo-bulb as described in 'Fl. Brit. Ind.,' but it is placed exactly as in *P. Wallichii*, Lindl. The calli from which it takes its name are two very low processes at the base of the mid-lobe. The lip is bilobed at the apex with a short mucro in the notch as in Blume's figure. The blunt rounded sepals and petals distinguish it readily from *P. Wallichii*, Lindl.

P. (§ Limatodes) pallidus, *Ridl., sp. nova. Caules* 2–3 ped. longi, validi, erecti, quadrangulati, in parte inferiore a vaginis longis longe acuminatis tenuibus striatis dissitis vaginati, in parte superiore foliigeri. *Folia* 9 poll. longa, 3 poll. lata, ovata, cuspidata, plicata, costata, subtus glaucescentia. *Racemi* 3–4, 4 poll. longi, e vaginis perforatis (in parte inferiore caulis sitis)

extrusi. *Bracteæ* ½ poll. longæ, lanceolatæ acuminatæ acutæ. *Flores* majusculi, 7–8 in racemo remoti, singulatim expansi; pedicelli cum ovariis 1-poll. longi. *Sepala* ¾ poll. longa, lanceolata acuta, flavescentia. *Petala* sepalis latiora, alba, basi intus a maculis violaceis ornata. *Labellum* oblongo-lanceolatum subacutum, aurantiaco-flavum secus lineas rubro-maculatum; calcar ½ poll. longum, rectum, cylindricum, acuminatum, pallide roseum. *Columna* longa; stelidia brevia curva, obtusa, basi dilatata. *Anthera* rostrata.

Hab. Perak: Maxwell's Hill, Larut Hills!
Selangor: Bukit Hitam, *Kelsall!*
Pahang: Tahan Woods!

It is quite possible that *Limatodis punctata*, Lindl., Fol. Orch. Limat., p. 2, may be this plant. It is a Sumatran plant only known from a drawing by De Vriese. The description is too meagre to be certain of what was intended.

NEPHELAPHYLLUM, Blume.

N. PULCHRUM, *Blume, Bijdr.*, p. 373 t. 32.

Hab. Singapore: In a damp, swampy wood, at Bukit Mandai! Sungei Brih!
Malacca: woods at the foot of Mt. Ophir! Bukit Sadanen, *R. Derry!*
Perak: Maxwell's Hill, Larut Hills!

A terrestrial plant growing on dead leaves in damp spots.

N. TENUIFLORUM, *Blume, Bijdr.*, p. 373.

Hab. Perak, *Scortechini.*
Kedah: Kedah Peak, in damp woods on the top of the hill, 4,000 feet alt!

TAINIA, Blume.

T. PENANGIANA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 820.

Hab. Penang: Government Hill, *C. Curtis!*

The specimens sent by Mr. Curtis differ in some respects from the description, but the type was apparently in bad condition. The plant has an unusually large stout conic pseudo-bulb 3 inches long and 2 inches thick, purple, covered partially with the remains of sheathing leaves. The leaf is

lanceolate acute long-petioled. The scape is much taller, purplish green; it bears nine or ten distant flowers. The sepals and petals are pale yellow veined with purple. The lip is buff and rose, dotted (especially towards the apex) with darker rose. The spur is short and clubbed, orange in colour. The column is narrowed at the base and widened above, buff thickly spotted with rose. The anther has the apex obscurely three-lobed, the front margin retuse. The pollinia are eight, the four upper oblong oblique lamelliform, the four lower smaller ovate flattened. There is a small retuse disc.

TAINIA LATILINGUA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 822, *Ic. Pl.*, t. 2093.

Hab. Perak, *Scortechini.*

T. ATROPURPUREA, *Ridl.* Terrestris. *Rhizoma* repens; radices crassæ. *Folia* ovata, profunde cordata, subacuta, herbacea; petiolus 4 poll. longus, crassus; lamina 6 poll longa, 4 poll. lata. *Scapus* 1 ped. longus, basi a vaginis membranaceis tectus, superne laxe racemosus. *Flores* majusculi, dissiti, purpurei. *Bracteæ* $\frac{1}{2}$ poll. longæ, lineares, acuminatæ; pedicelli (ovario incluso) bracteâ breviores. *Sepalum* posticum $\frac{1}{2}$ poll. longum, $\frac{3}{16}$ poll. latum, lanceolatum acutum, lateralia basi in mentum $\frac{3}{8}$ poll. longum producta. *Petala* cum sepalis æquilonga, paullo latiora. *Labellum* $\frac{3}{4}$ poll. longum, $\frac{1}{2}$ poll. latum, ovatum acutum, a nervis 8 paullo elevatis percursum; carinæ 2 parallelæ, lamelliformes, inter has nervus carnosus lamelliformis minus elevatus. *Columna* $\frac{1}{4}$ poll. longa, erecta; pes longior; alæ majusculæ, rectæ; clinandrium ovatum, margine postice elevato; rostellum latum, ovatum, obtusum. *Stigma* ovatum, margine inferiore elevato. *Nephelaphyllum grandiflorum*, Hook. f., Fl. Brit. Ind., vi. p. 192.

Hab. Perak: Maxwell's Hill, 2,000 feet alt.; growing among dead leaves!

This was described from two drawings, one by Scortechini, the other by Kunstler. The former, evidently unfinished and without details, I have seen; and it is clearly intended for the plant above described, which was sent me in flower by Mr. Curtis, and of which I have also twice collected living plants on the banks of the road leading to the top of the Larut Hill range from Thaiping. Unfortunately the only flowers I have seen were very withered, and had lost their pollen. It is a handsome plant, but very difficult of culture. The petioles and scape are purple, the flowers of a dark pink, the tip of the lip (which is more fleshy than the rest) being of a deep maroon.

It cannot, I think, be referred to *Nephelaphyllum*, which has a spur to the lip and not a mentum formed by the lateral sepals adnate to the long foot of the column. It seems to me clearly to belong to the genus *Tainia*.

In removing it to this genus, I have not retained the specific name *grandiflora*, because the flowers are really much smaller than those of *T. speciosa*, Blume, and *T. Maingayi*, Hook. f.

TAINIA SPECIOSA, *Blume*, *Bijdr.*, p. 354.
Hab. Malacca : Mt. Ophir!
Perak : *Scortechini.*
Kedah : Kedah Peak, abundant!

This grows in dry woods, in the hill districts, at about 3,000 feet altitude. Maingay gives "flowers white, tails slightly yellow." But in the plants which I have seen the sepals and petals are greenish yellow with red lines, the lip bright yellow, with some red streaks on the lateral lobes. The anther horns are very short and violet.

T. MAINGAYI, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 822, *et Ic. Pl.*, t. 2094.
Hab. Penang: *Maingayi.*
Kedah: Kedah Peak!

The Kedah plant apparently is this species, but the buds are too young to make out clearly. The flowers appeared to be deep purple.

CHRYSOGLOSSUM, Blume.

C. VILLOSUM, *Blume*, *Bijdr.*, p. 338, t. 17.
Hab. Perak : *Scortechini.*

I have only seen a sketch of this among Scortechini's drawings.

PLOCOGLOTTIS, Blume.

The peculiar form of the pollinia in this genus has caused some doubt as to where in the order it should be placed; in Bentham and Hooker's 'Genera Plantarum' it is doubtfully referred to *Vandeæ*. The pollinia, however, are not those of any *Vandea*, but seem to be not very much modified from those of some species of *Tainia*, to which genus *Plocoglottis* in other respects seems most nearly allied.

In *P. porphyrophylla*, Ridl., the pollinia consist of four kidney-shaped masses of rather pulverulent pollen, attached by their inner edges to stalks, of which two are longer than the others; these end below in a mass of roughly triangular outline. Both the stalks and this disc-like mass are of a yellow colour, and contain much pollen mixed with viscid matter; and it appears that the supposed disc rather corresponds to the two lowest pairs of pollinia of such a plant as *Tainia speciosa*, Blume, than to the viscid disc of, say, a *Saccolabium*. A large mass of white viscous matter overlies the rostellum, and, becoming readily attached to the pollinia, acts as a viscid disc. The arrangements for insect fertilization are very curious, and differ from any other species known to me.

The flowers open singly, two or three at a time, in all I have seen, though Blume figures the whole raceme open at once in several species. They are of dull colour, often purple and yellow, and one species at least (*P. fœtida*, Ridl.) has a most unpleasant carrion odour. Hence one would expect them to be fertilized by Diptera, which is indeed the case. In *P. porphyrophylla*, Ridl., the flowers open wide; the dorsal sepal and petals are narrow and yellowish coloured, and are thrown back when the flower expands. The column is arched over the lip. The lateral sepals are much larger than the dorsal one, of a bright purple colour, polished, and the most conspicuous part of the flower, their inner half, is thickened and involute. The lip is broad and shorter than the sepals. It has a yellow ground, thickly marbled with red; the basal edges are thinner in texture, yellow with black spots, and fringed with small processes. The apex of the lip is very broad, and the outer angles project a short distance. On the disc near the angles are a pair of shining, deep purple horns, which resemble drops of nectar. In the bud, the lip lies flat against the column, but, as the flower opens, it is drawn down in such a manner as to lie flat at some distance below it. This is effected by the lateral sepals, the thickened inner edges of which overlap the prolonged angles of the lip, and, as they are deflexed, draw down the lip. When a fly alights on the lip in search of nectar, it sets it free by its weight or by slightly separating the lateral sepals with its feet, and the lip springs up suddenly (its flexible claw acting as a spring) and strikes the face of the column, where it permanently remains, pressing the insect against the pollen masses, so that it cannot escape from the trap without withdrawing the pollen. As the lip remains then pressed against the column, it is impossible for a fly to get at the nectar any more; so that the first flower visited by a fly cannot be fertilized, but, by pollinating, the insect can fertilize the next one visited. A somewhat similar arrangement occurs in the *Marantaceæ*, where the style is held back in the hooded staminode till the entry of the fertilizer sets it free, when it suddenly curves downwards, sweeping the pollen out of its chamber as it does so, and plastering it on the insect's back.

In *P. javanica*, Blume, a somewhat different arrangement occurs. Here the sepals and petals are all nearly equal in size, and all are orange with darker spots. There is no thickening or in-rolling of the lateral sepals, which, indeed, are divaricate at the apices, but they grasp the basal angles of the square lip with their basal inner edges, and, being deflexed, draw the lip down as in *P. porphyrophylla*, Ridl. A slight touch on the pale-coloured lip sets it free, and it springs up suddenly as before.

PLOCOGLOTTIS PORPHYROPHYLLA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 368.

Hab. Singapore: Kranji! Selitar! Toas!
Johore: Batu Pahat! Tana Runto! Ulu Kahang.
Pahang: Pekan!
Perak: *Scortechini.*
Kedah: From near the coast (native dealer)!

Common in many places in dry woods. The leaves are of a lovely purple colour beneath, and as they stand erect have a beautiful stained glass appearance by transmitted sunlight. I suppose the plant referred to *P. acuminata*, Blume, in 'Fl. Brit. Ind.,' from "Perak, 2–3,000 feet, King's Collector," is this plant. There is a good sketch of it in Scortechini's drawings. A dealer gave me a plant from the Kedah Coast, in which leaves, bulbs, scape were all green, as were also the sepals. It is evidently specifically the same, but looked very different at first sight.

PLOCOGLOTTIS JAVANICA, *Blume, Bijdr.*, p. 381. t. 21.

Hab. Singapore: Local; Chan Chu Kang, and Choa Chu Kang!
Johore: Hulu Batu Pahat, *Lake and Kelsall!* Tengarah, *J. Feilding!*
Pahang: Kota Glanggi Woods!
Perak: Maxwell's Hill, Larut Hills!
Kedah: Kedah Peak, woods!

This grows in damp, thick woods. As in all the species, I have seen the flowers open one by one, the lower ones, unless fertilized, falling off as the ones above open. In Blume's figure, l.c., however, many flowers are represented as opening at once.

P. FŒTIDA, *Ridl., sp. nova. Rhizoma* crassiusculum; radices crassæ, lanuginosæ. *Caules* 3 ped longi, plures, foliati. *Folia* 6 poll. longa, 1½–1¾ poll. lata, late lanceolata vel elliptico-lanceolata, acuta, a costis 3–5 elevatis percursa; vaginæ teretes, ore integræ. *Scapus* altior, validus, pubescens, basi (vaginis paucis exceptis) nudus, superne laxe racemosus. *Flores* usque ad 20, majusculi, singulatim expansi, fœtidi. *Bracteæ* ¼ poll. longæ, ovatæ acutæ, pubescentes, persistentes. *Sepalum* posticum ¾ poll. longum, ⅜ poll. latum, ovato-lanceolatum acutum, lateralia torta deflexa. *Petala* cum sepalis subæquilonga, lanceolata acuta; sepala petala aurantiaca rubromaculata. *Labellum* ¾ poll. longum, ferme ¾ poll. latum, quadratum, 3-dentatum, carnosum, citrinum, basi ad columnæ margines adnatum. *Columna* brevis, crassa. *Anthera* conica; pollinia globosa, pulverulenta.

Hab. Singapore: Bukit Timah!
Johore: Tanjong Kopang, near Johor.
Malacca: Jus!
Selangor: Kwala Lumpur!

This is not very rare, but seems to flower very rarely. It is called "*Gūlumbak*" in Malacca.

The flower emits a most fœtid stercoraceous odour. It occurs in dense, damp jungles. The affinity of the plant is with *P. dilatata*, Blume.

CLADERIA, Hook. f.

C. VIRIDIFLORA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 810.
Hab. Singapore: Bajan, Tanglin, &c., very common.
Johore: Simpai!
Malacca: common!
Penang: Government Hill! West Hill!
Perak: Hermitage Hill! Dindings!
Pahang: Tahan Woods!
Also Borneo, at Matang! and elsewhere.

Common in the forests, but seldom met with in flower. The flowers are light green, reticulate with darker markings. The lip, which is pubescent at the base, has a club-shaped white-grooved ridge on the disc; the epichil consists of two oblong blunt divaricate lobes. The column is simply arched in life, hardly sigmoid; it is pubescent at the base. The pollinia are two in number, elliptic, joined by their points at the apex, and divaricate below; a ridge runs down the back of each.

CŒLOGYNE, Lindl.

C. TESTACEA, *Lindl.*, *Bot. Reg.* (1842) *Misc.*, p. 38.
Hab. Singapore: common in sandy places near the coast, usually terrestrial. Sungei Morai! Chan Chu Kang! Kranji!
Johore: Tana Runto! &c.

The commonest species in the south of the peninsula, growing in large clumps often on the ground, never high upon trees. The racemes are rather short and pendulous. The flowers have an unpleasant scent.

C. TOMENTOSA, *Lindl.*, *Fol. Orchid. Cœlog.*, p. 3.
Hab. Malacca: Mt. Ophir!
Perak: upper part of the Larut Hills! Abundant.
Selangor: Bukit Hitam, *Kelsall!*
Penang: Government Hill, *Curtis!*

Common at about 4,000 feet elevation on trees. The var? *penangensis* ('Fl. Brit. Ind.,' v. p. 830) is distinguished by its shorter pseudo-bulb elliptic-obovate leaves and ridges of lip not coalescing. The species varies very much, as do most in the genus, as to bulb and leaf; most specimens I have seen have the ridges on the disc quite free and not coalesced. The Bukit Hitam plant had remarkably narrow and slender pseudo-bulbs, not at all ovoid.

CŒLOGYNE MASSANGEANA, *Reichb. f. in Gard. Chron.* (1878) II. p. 684.

Hab. Perak: Larut Hills, Maxwell's Hill! In dense jungle on tree trunks at 3,000 feet alt.; not at all common.

C. ROCHUSSENII, *De Vriese, Illustr. Orch.*, t. 2 et t. 11 f. 6; *Reichb. f., Xenia Orch.*, i. p. 212 t. 85.

C. macrobulbon, Hook. f., Fl. Brit. Ind., v. p. 830.

Hab. Singapore: At Selitar!
Johore: Gunong Janeng! Batu Pahat! *Lake and Kelsall;* Pulau Dayak, an island east of Johore, *J. Feilding.*
Pahang: Tahan River Woods!
Sungei Ujong: (*Native collector*)!
Penang: *Wallich* n. 1969/2.
Perak: *Scortechini.*
Also Borneo! Sumatra! Java.

This is often brought in by the orchid dealers, and, indeed, has been shipped home in bulk as *C. Dayana*, Reichb. f., which out of flower it somewhat resembles.

The natives of Sungei Ujong call it "*Sakat Tulô Ular*" (Snake-bones orchid).

C. CUMINGII, *Lindl., Bot. Reg.* (1840) *Misc.*, p. 76.

Hab. Singapore: Bukit Timah, on high trees!
Malacca: Mt. Ophir!
Pahang: Tahan Woods!
Perak: Larut Hills! Waterloo estate, Kwala Kangsa!

In the forests this plant grows on the tops of the loftiest trees, and is very inaccessible. On Mount Ophir it forms large mats on the bare and smooth granite rocks.

The arrangement and number of ridges on the lip vary very much, and, indeed, are often very unsafe diagnostic characters in *Cœlogyne.*

C. SPECIOSA, *Lindl., Gen. et Sp. Orch.*, p. 39.

Hab. Pahang: Tahan River Woods!
Perak: Larut Hills, at about 3,000 feet elevation and upwards; abundant!
Penang: Government Hill!

On trees in dense jungle; often common in the hill districts. A native also of Java.

Cœlogyne casta, *Ridl., sp. nova.* *Pseudo-bulbi* 3 poll. longi, 1 poll. crassi, elongati conici, costati. *Folia* 2, 8 poll. longa, 1¼ poll. lata, anguste lanceolata acuta, in petiolum attenuata, flaccida, costata. *Scapus* lateralis, erecto-nutans, basi a vaginis viridibus (summis foliaceis) tectus, ferme usque ad vaginas floriferus. *Flores* c. 5 magni, 3 poll. lati, speciosi. *Bracteæ* 2 poll. longæ, lanceolatæ acuminatæ, papyraceæ; pedicelli 1 poll. longi. *Sepala* 1½ poll. longa, ½ poll. lata, lanceolata acuminata acuta. *Petala* sepalis angustiora, lineari-lanceolata acuminata. *Labellum* sepalis brevius, ovatum; lobi laterales magni obtusi flavi aurantiaco-venosi, medius breviusculus ovatus cuspidatus basi crispo-marginatus, albus basi a maculâ citrinâ notatus; carinæ in hypochilii disco 3 parallelæ, crispæ, albæ, in epichilio 2 externæ adduntur. *Columna* obscure aurantiaca, superne alata; clinandrii margo elevatus, truncatus, utrinque 1-dentatus. *Anthera* campanulata, apice incrassata; rostellum latum, in margine sinuatum; pollinia inæqualia, semi-elliptica, complanata, 2 postica minora. *Stigma* oblongum, breve.

Hab. Selangor: Bukit Hitam, *H. J. Kelsall!*

A very beautiful plant with widely expanded flowers, remarkable for the acuminate sepals and petals of the purest white.

C. Foerstermanni, *Reichb. f. in Gard. Chron.* (1886) ii. p. 262.

C. Maingayi, Hook. f., Fl. Brit. Ind., v. p. 831.

Hab. Malacca: said to be common on lofty trees, *R. Derry!*
Pahang: Kwantan, *Durnford!* Tahan River!
Also Borneo!

I am assured by the orchid collectors that this plant is the one introduced from Borneo by Förstermann, and described by Reichenbach as *C. Foerstermanni.* It is a very noble species but not easy to cultivate, and, as it seems to prefer the upper branches of the loftiest trees, is difficult to collect and rarely brought in by collectors.

C. longibractata, *Hook. f., Fl. Brit. Ind.*, vi. p. 194.

Hab. Perak: *Kunstler.*

C. angustifolia, *Ridl., sp. nova.* *Pseudo-bulbi* 2½ poll.

longi, 1 poll. crassi, conici, leves, olivacei, in latere altero racemifero, sulcati. *Folia* 2, 10 poll. longa, 1 poll. lata, lanceolata acuminata, petiolata, 3-nervia, erecto-nutantia. *Scapus* foliis brevior, pauciflorus; bracteæ basales, ovatæ, obtusæ. *Flores* iis *C. testaceæ*, Lindl., æquales, subsecundi. *Bracteæ* lanceolatæ acutæ, pallide bruneæ, caducæ. *Sepala* 1 poll. longa, ¼ poll. lata, lanceolato-lorata, subacuta, carinata, ochroleuca, in margine recurva. *Petala* cum sepalis æquilonga, multo angustiora, spathulato-linearia. *Labellum* ¾ poll. longum, trilobum; lobi laterales longi, obtusi, intus brunei, extra pallidi, medius obovato-oblongus apice rotundatus in margine undulatus; discus albus in margine flavus bruneo-maculatus; carinæ 3, 2 laterales altæ albæ, media minor (basi præsertim) sinuata. *Columna* ¾ poll. longa, basi angusta superne arcuata, ochroleuca bruneo-tincta; clinandrium alte marginatum, rotundatum. *Anthera* conica, pileata; rostellum magnum, latum, rotundatum, rufo-bruneum. *Stigma* semi-ovale, margine elevato.

Hab. Lankawi Islands, *C. Curtis!*

This seems to be nearest to *C. graminifolia*, Par. and Reichb. f., but is not so narrow in the leaf, and has a different lip.

CŒLOGYNE QUADRANGULARIS, *Ridl., sp. nova.* *Rhizoma* crassum, lignosum. *Pseudo-bulbi* 3 poll. longi, basi 1½ poll. crassi, 4-angulati, conici, leves, sæpissime arcte approximati. *Folia* 6 poll. longa, 2 poll. lata, late lanceolata acuta, basi attenuata, 5-nervia. *Racemi* 8 poll. longi, usque ad 8-flori, penduli. *Flores* iis *C. tomentosæ* æquales, dissiti. *Pedicelli* 1½ poll. longi, albi, sparse nigro-tomentosi; bracteæ ¼ poll. longæ, oblongæ, convolutæ. *Sepalum* posticum 1¼ poll. longum ¼ poll. latum lanceolatum acutum, lateralia paullisper longiora falcata acute carinata. *Petala* 1 poll. longa ⅛ poll. lata, lanceolato-linearia acuta. *Labellum* (explanatum) 1 poll. longum ¾ poll. latum; lobi laterales oblongi obtusi extra albi intus brunei albo-nervosi; discus albus, 3-carinatus, basi carinarum lateralium a processubus parvis oblongis ciliatis auctus; carina media usque ad trientem magis elevata; carinæ omnes denticulatæ; lobus medius ovatus obtusus, albus in medio bruneo-maculatus, a carinis 5 integris percursus. *Columna* ¾ poll. longa, alba basi brunescens, in margine brunea, in ventre bruneo-3-striata; clinandrii margo dorsalis truncatus, irregulariter denticulatus.

Anthera atro-brunea; rostellum ovatum, obtusum. *Stigma* hippocrepiforme, in margine incrassatum.

Hab. Perak: Trees on Gunong Hijan, alt. 5,000!

An ally of *C. tomentosa*, Lindl., like which it has the minute black tomentum, though much more sparingly on the pedicel. The bracts are very much shorter, the leaves and bulbs quite different in form, and the five ridges on the lip are entire and not broken up into truncate processes as in that species. It flowers in July.

CŒLOGYNE PACHYBULBON, *Ridl., sp. nova.* *Rhizoma* ¼ poll. in diam., lignosum; radices longæ, albæ. *Pseudo-bulbi* 2 poll. longi, 1¾ lati, ovoidei, leves, olivaceo-flavi. *Folia* 12 poll. longa, 2 poll. lata, lanceolata acuta, læte viridia, tenuiter coriacea; petiolus 2 poll. longus, canaliculatus; carina crassa; nervi 2, elevati. *Scapus* 6 poll. longus, lateralis, basi a vaginis dense tectus. *Flores* c. 6, subsecundi, iis *C. testaceæ*, Lindl., æquales. *Bracteæ* 1⅛ poll. longæ, oblongo-ovatæ obtusæ, cervinæ, deciduæ; pedicelli cum ovariis 1 poll. longi, pallide cervini. *Sepala* ¾ poll. longa, lanceolata, ochroleuca, lateralia carinata. *Petala* linearia, obtusa, ochroleuca. *Labellum* petalis paullo brevius; lobi laterales rotundati obtusi intus brunei, medius multo longior basi oblongus citrinus apice dilatatus truncatus integer bruneus, in margine albus; carinæ 2 sinuatæ, haud multum elevatæ, apice crispæ. *Columna* ½ poll. longa, arcuata, clavata; clinandrii margo integer, rotundatus, antheram haud multo superans. *Anthera* brunea, pileata; pollinia aciniformia, tenuia, plana; rostellum latum, tenue, planum, integrum.

Hab. Siam: Pungah, *Curtis* (1894)!

A handsome and free-flowering species, remarkable for the thick conic smooth bulbs hardly at all grooved. The lip has broad blunt lateral lobes, the terminal one being rather long and oblong till the apex, where it rather suddenly enlarges into an almost reniform blade. The base is chrome yellow except between the two keels; the end is white with a sienna brown centre. The intermediate keel is very obscure, hardly to be seen.

C. MAYERIANA, *Reichb. f. in Gard. Chron.* (1877) II. p. 134. *Rhizoma* longum, ferme ¼ poll. crassum, validum, lignosum, a vaginis tectum. *Pseudo-bulbi* 2 poll. longi, 1 poll. lati, ½ poll. crassi, ovates, compressi, longitudinaliter rugosi, læte virentes, inter se 3–4 poll. distantes. *Folia* 8 poll. longa, 1 poll. lata, lanceolata acuta, carinata, læte virentia; petiolus crassus, canaliculatus; nervi dorsales 4, elevati. *Scapi* 1 ped. longi, laterales, a pseudo-bulbis remoti, erecti, basi a vaginis puncticulatis omnino tecti; racemus pauciflores. *Flores* magni, pulchri, dissiti. *Bracteæ* 1 poll. longæ, oblongæ, obtusæ, convolutæ, punctatæ, diu persistentes; pedicelli $1\frac{3}{4}$ poll. longi, pallide virides; ovaria $\frac{1}{4}$ poll. longa, pallide viridia. *Sepala* $1\frac{1}{4}$ poll. longa, $\frac{1}{2}$ poll. lata, oblonga, obtusa, carinata, læte viridia. *Petala* $\frac{3}{4}$ poll. longa, $\frac{1}{4}$ poll. lata, lineari-lanceolata acuta, læte viridia; nervus medius conspicuus. *Labellum* 1 poll. longum, 3-lobum; lobi laterales elongati, lati, basi columnam amplectentes, apice lati subobtusi viridi-albi atro-3-nervati; discus latus, viridis; carinæ 3, 2 exteriores altæ acutæ minute atro-denticulatæ, interior paullo elevata a cristâ parvâ albâ mox terminata; macula ochrea in carinarum basi additur; lobus medius panduratus, crispus, bilobus; lobi subrotundi dento mediano interjecto; carinæ 4, valde (præsertim 2 interiores) cristatæ, viridi-nerviæ, atro-maculatæ. *Columna* $\frac{3}{4}$ poll. longa, basi angustata, superne clavata, smaragdina, late alata; clinandrium profundum, in margine dorsali cucullatum. *Anthera* parva, subconica, obtusa, viridis, in margine truncata; pollinia 4, compressa, triangulari-ovata; discus majusculus, triangularis; rostellum latum, truncatum, laminæforme, integrum. *Stigma* prominens, semicirculare.

Hab. Singapore: Sungei Buloh! Kranji!
Johore: Tana Runto! Also near Johore town.
Rhio: Native dealers! Also Sumatra, at Djambi!

This charming plant grows usually at the foot of the Nibong palms, *Oncosperma filamentosum*, Blume, in sandy places on the coast near the mangrove swamps. It appears to be almost confined to the coasts of the Johore Strait, where, however, it is by no means rare. It is a straggling, far-creeping plant, with flowers resembling in colouring those of *C. pandurata*, Lindl., but somewhat smaller. I presume this is Reichenbach's *C. Mayeriana*, a plant described without locality, and which has been lost from European cultivation. As it seems to be so little known I have re-described it more fully.

Cœlogyne pandurata, *Lindl. in Gard. Chron.* (1853) p. 791.

Hab. Perak: *Scortechini*, rather rare. Abundant in Borneo and Sumatra.

CŒLOGYNE ASPERATA, *Lindl. in Journ. Hort. Soc.*, iv. (1849) p. 221.

Hab. Perak: on rocks! Local. Abundant in Borneo, and occurring in Sumatra.

C. PRASINA, *Ridl., sp. nova.* *Rhizoma* longe repens, $\frac{1}{4}$ poll. in diam.; radices longissimæ, crassæ. *Pseudo-bulbi* 2 poll. longi, fusiformes, remoti. *Folia* bina, 5 poll. longa, 1$\frac{1}{2}$ poll. lata, ovata vel elliptica, acuta, 3–5-nervia; petiolus $\frac{1}{2}$–$\frac{3}{4}$ poll. longus. *Scapus* 6 poll. longus, ex apice pseudo-bulbi ortus, basi (3 poll.) nudus flexuosus; bracteæ 1 poll. longæ, lanceolatæ acuminatæ, deciduæ. *Flores* c. 5, parvi, prasini; pedicelli $\frac{1}{2}$ poll. longi, graciles. *Sepala* $\frac{3}{8}$ poll. longa, $\frac{1}{16}$ poll. lata, lanceolata acuta. *Petala* sepalis breviora, basi lanceolata apice setacea. *Labellum* sepalo multo longius, panduratum; lobi laterales breves, rotundati, medius multo longior oblongus basi paullo angustatus; carinæ 2, crassæ, integræ, in disco hypochilio sitæ, in lobo medio productæ; linea mediana paullo elevata. *Columna* brevis, in dorso carinata utrinque elevato-lineata; clinandrii margo integer, rotundatus, antheram paullo superans; rostellum ovatum, acutum. *Anthera* apice rotundata, retusa, in margine acuta.

Hab. Kedah Peak: 3–4,000 feet, abundant! (5131).

This grows at Kedah Peak upon trees, and on the ground in great masses. The rhizome is rather slender, and bears distant loose sheaths from a quarter to half an inch long, brown, thin, and blunt. The pseudo-bulbs are about 2 or 3 inches apart. The flowers are produced on lax slender racemes rising from between the leaves and but little longer. The flowers, opening one at a time, are as small as any in the genus; of an apple green colour and very inconspicuous.

The petals are remarkably narrow, in fact quite setaceous at the apices. The lip has very short lateral lobes and a much longer terminal one, which is narrowed at the base, so that the lip when spread out is pandurate. It is most nearly allied to *C. stenochila*, Hook. f. (Described from dry specimens and field notes.)

C. STENOCHILA, *Hook. f., Fl. Brit. Ind.*, v. p. 837, *et Ic. Pl.*, t. 2106.

Hab. Perak: Gunong Batu Putih, *Wray.*

C. CARNEA, *Hook. f., Fl. Brit. Ind.*, v. p. 838, *et Ic. Pl.*, t. 2107.
Hab. Perak: *Scortechini.*

Cœlogyne anceps, *Hook. f., Fl. Brit. Ind.*, v. p. 840, *et Ic. Pl.*, t. 2109.

Hab. Perak: *Scortechini.*

C. bimaculata, *Ridl., sp. nova.* *Pseudo-bulbi* 3 poll. longi, 1½ poll. crassi, conici raro subcylindrici. *Folia* bina, 8 poll. longa, 2 poll. lata, lanceolata acuta, breviter petiolata. *Scapus* ex apice pseudo-bulbi ortus, erectus, gracilis, basi longe nudus. *Bracteæ* 1½ poll. longæ, lanceolatæ acuminatæ, papyraceæ, deciduæ, flores superantes; pedicelli ½ poll. longi. *Flores* explanati 1 poll. lati. *Sepala* lanceolata, acuta, alba. *Petala* sepalis angustiora, lanceolata, spathulata. *Labellum* petalis brevius, anguste oblongum; lobi laterales parvi, breves, obtusi, medius multo longior albus; macula aurantiaca in utroque latere loborum lateralium sita; lobi medii discus a maculâ aurantiacâ ornatus; callus transversus semilunaris in basi labelli; carinæ 3, infractæ. *Columna* virescens, alata; clinandrii margo rotundatus, integer. *Anthera* plana, lata, bilocularis, tenuis, brunea; pollinia 1-seriata 4, pyriformia. *Stigma* magnum, rotundatum, ovatum.

Hab. Perak: ? (cult. in Hort. Bot. Singapore, 1893.)

The exact locality of this plant, which flowered in the Botanic Gardens, I do not know; but I believe it came from the Larut Hills. The mid-epichil is longer than the rest of the lip. Three keels not crisped, but broken up at intervals at the base, run down the hypochil on to the epichil; two start from near the base, the median one from some way up the middle, and is carried further on the terminal lobe than the two side ones. The pollen masses are very dissimilar to those of most Cælogynes.

C. pusilla, *Ridl., sp. nova.* *Pseudo-bulbi* 1 poll. longi, ¼ poll. crassi, conici, congesti, a vaginis ovatis membranaceis tecti. *Folia* singula, 3–4 poll. longa, 1 poll. lata, lanceolata acuta, coriacea; petiolus 1 poll. longus. *Scapus* 4 poll. longus, foliis brevior, erectus, basi a vaginis lanceolatis tectus, superne floriferus. *Bracteæ* 1 poll. longæ, lanceolatæ acutæ, flores superantes, papyraceæ, mox deflexæ; pedicelli ¾ poll. longi, tenues. *Flores* parvuli. *Sepala* ½ poll. longa, lanceolata acuta, carnea. *Petala* sepalis multo angustiora, linearia. *Labelli* ochracei basis oblonga, lamina flexa; lobi laterales parvi, oblongi, truncati, in angulo inferiore dentiformes; discus late oblongus; carinæ 2, acutæ; lobus terminalis albus, bilobus, lobis rotundatis. *Columna* ½ poll. longa, basi oblonga, superne late dilatata, in margine late sinuata. *Anthera* parva, ovata, aurantiaca; rostellum ovatum, tenue. *Stigma* reniforme, margine elevata.

Hab. Perak: Larut Hills! 4,000 feet alt.

A small compact plant with the foliage and pseudo-bulbs of a *Pholidota*, and a short erect scape. The lip is pandurate in outline with the disc thickened and bearing two low keels. At the base, which is slightly saccate, is a good deal of nectar.

PHOLIDOTA, Lindl.

P. IMBRICATA, *Lindl. in Hook., Exot. Fl.*, ii. t. 138.

Hab. Lankawi Islands: *C. Curtis!*
Siam: Bangtaphan, *Dr. Keith!* Tonka (*Native collector*).
Perak: *Scortechini.*

Apparently common in Java and Borneo. The peninsula form is generally the stunted one with short leaves and peduncle.

P. MICRANTHA, *Hook. f., Fl. Brit. Ind.*, v. p. 847, *et Ic. Pl.*, t. 1891.

Hab. Perak: Gunong Batu Putih, *Wray.*

P. DECURVA, *Ridl., sp. nova.* *Caules* elongati, ramosi; internodii 3–4 poll. longi, pseudo-bulbosi, teretes, olivacei, basi vaginati superne nudi. *Folia* bina, 4 poll. longa, 1½ poll. lata, late obovata vel oblanceolata, acuta, canaliculata, striata, atroviridia. *Racemus* 6 poll. longus, gracilis, decurvus, basi nudus superne flexuosus; bracteæ lanceolatæ acutæ, caducæ. *Flores* ferme 1 poll. lati, plures. *Sepala* ¼ poll. longa, ovata aut oblonga, subacuta. *Petala* sepalis minora, oblonga; sepala petala carnea. *Labellum* oblongum, cymbæforme, marginibus involutis; carinæ 5, basi incrassatæ, apices versus attenuatæ: epichilium bilobum, subquadratum, basi tortum, roseo-carneum basi aurantiacum. *Columna* recta, oblonga, rosea. *Anthera* depressa, plana, bilocularis; margo posticus prolongatus lobis 2 oblongis rotundatis, anticus rostratus; rostellum ovatum acuminatum acutum, integrum.

Hab. Perak: *C. Curtis!* (cultivated in Penang Gardens.)

This is most nearly allied to *P. articulata*, Lindl.

CALANTHE, R. Br.

C. VERATRIFOLIA, *R. Br. in Bot. Reg. sub* t. 573.

Hab. Johore; Sedili River!
Perak: Larut Hills, 2,000 feet alt.
Selangor: Bukit Hitam, *Kelsall!*

Common in Sumatra (at Siak and other localities).

I cannot satisfactorily distinguish what I take to be *C. diploxiphion*, Hook. f., from the common *C. veratrifolia*, R. Br.; it seems to be merely a form growing in thick wet jungle. The common plant is very variable in form of leaf, size of bracts, compactness of raceme, and length of spur, and in the Larut Hills almost every plant looks different. In the drier woods of the Sedili River, one gets the compact-headed form with fairly large flowers; and the same form is brought by the orchid collectors from Siak in Sumatra. A very distinct looking form from Perak has a lax elongate raceme, with broad bracts, and large flowers with the sepals tipped with bright green; but it passes into the common form. The colour of the callus varies from white to yellow and orange-red.

C. WRAYI, *Hook. f., Ic. Pl.*, t. 2114, except for the pectinate calli, seems to me the same species. The plant described in the 'Flora of British India,' v, p. 850, under the same name, I take to be *C. Ceciliæ*, Hort. Low.

C. CECILIÆ, *Hort. Low, ex Reichb. f. in Gard. Chron.* (1883) I. p. 432.

Hab. Sungei Ujong: Gunong Talan!
Perak: Hermitage Hill, 2,000 feet alt!
Pahang: Kota Glanggi Woods?

This plant was described by Reichenbach from a living specimen sent from Perak by Sir Hugh Low. The description was overlooked accidentally in the 'Flora of British India.' The well-known locality for it is on the slopes of the Hermitage Hill, near Kwala Kangsa, where it grows on granite rocks.

The natives of Sungei Ujong call it "*Subôy.*"

Reichenbach gives its affinity as with *C. parviflora*, Lindl., a Javan plant. I do not know this, but it is certain that *C. Ceciliæ* is very near *C. Masuca*, Lindl. There is a figure of it among Scortechini's drawings, and I take it that this is the

C. Wrayi var. ? *Scortechinii* of the 'Flora of British India.' As to the type of *C. Wrayi*, I am rather at fault, the description in the 'Flora of British India,' v, p. 850, suits some forms of *C. Ceciliæ* very well; but the figure and description in the 'Icones Plantarum,' t. 2114, do not. In the first the lip is described as having the "mid-lobe cleft into two dimidiate obovate crenulate segments disc with conical calli"; in the latter, "lobis oblongis obtusis divaricatis disco basi callis parvis pectinatis instructo," and the lobes are figured quite entire.

The Pahang plant may possibly be distinct; the flowers were as dark violet as *C. Masuca*, Lindl.

CALANTHE CURCULIGOIDES, *Lindl., Gen. et Sp. Orch.*, p. 251; *et in Wall. List.*, n. 7340.

Hab. Singapore: Common; Choa Chu Kang! Kranji! Toa Payoh!
Johore: Gunong Pulai!
Perak: Maxwell's Hill, Larut Hills!
Also occurs in Luigga (*Hulbett*)!

This charming plant grows, often abundantly, in wet swampy woods in dead and rotten leaves. It flowers in September and October. I have seen small woods dotted all over with its showy orange spikes.

The *Calanthe curculigoides* of the 'Botanical Magazine,' t. 6104, is quite a distinct plant.

C. SCORTECHINII, *Hook. f., Fl. Brit. Ind.*, v. p. 854.

Hab. Perak: Larut Hills, abundant.

This much resembles *C. curculigoides*, Lindl., when out of flower, and is sometimes brought in by collectors for that species. It is a very shabby uninteresting plant. The enormous pale greenish bracts, very much longer than the flower, 2 inches in length, fall off as the flowers develop. The flower is light yellow. It seems to barely open.

C. ANGUSTIFOLIA, *Lindl., Gen. et Sp. Orch.*, p. 251.

Hab. Malacca: Woods on the lower slope of Mt. Ophir!
Perak: Gunong Hijan, Larut Hills; 6,000 feet alt.!

The bracts are 1½ inches long, narrow lanceolate acuminate. This is described as having "stem very short or 0" in the 'Fl. Brit. Ind.,' v. p. 854; but it has, as shown in the figure in 'Xenia Orchidacea,' i. t. 79, quite a long slender rhizome.

CALANTHE ? GIGANTEA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 856.

Hab. Perak: *Wray*, *King's Collector.*

I know nothing of this.

C. (§ PREPTANTHE) RUBENS, *Ridl. in Gard. Chron.* (1890) I. p. 576.

Hab. Lankawi Islands: *C. Curtis!*

There are several forms of this, varying in colour from white, or cream, to deep rose colour. It is, however, very distinct in size and form of lip from *C. vestita*, Wall.

ARUNDINA, Blume.

A. SPECIOSA, *Blume*, *Bijdr.*, p. 401, t. 73.

A. bambusifolia, Lindl. in Wall. Cat., n. 3751.

A. densa, Lindl., Bot. Reg. (1842) Misc., p. 25, t. 38.

A. densiflora, Hook. f., Fl. Brit. Ind., v. p. 857, sphalm.

Hab. Johore: Gunong Janeng, *Kelsall!*
Malacca: Mt. Ophir, abundant!
Pahang: River Tahan!
Perak: Kinta!

The Singapore locality given in 'Fl. Brit. Ind.' must be an error. The plant only occurs in the higher mountain districts, growing on rocks or gravelly islets in streams, and there is no such locality in Singapore.

A. REVOLUTA, *Hook. f.*, *Fl. Brit. Ind.*, v. p. 858.

Hab. Perak: On rocks at the waterfall, Thaiping!

A very small-flowered species. The sepals and petals are pale rose coloured, the lip rosy pink, darkest at the apex, with some yellow in the disc.

A. CHINENSIS, *Blume*, *Bijdr.*, p. 402?

Hab. Kedah Peak: on rocks, often precipitous. Flowers white with brown streaks and a yellow patch on the lip.

I am very doubtful as to what Blume's plant is. The Hong-Kong plant, commonly called *A. chinensis*, is *A. Philippi*, Reichb. f., with only *three* elevated ridges on the lip. The Kedah plant is quite different, but I can only see three really thickened nerves on the lip, instead of five lamellate ones. The flowers are rather bigger than those of *A. Philippii*, and quite different in colour.

DILOCHIA, Lindl.

D. Wallichii, *Lindl., Gen. et Sp. Orch.*, p. 38, *et in Wall. List*, n. 1952.

Hab. Singapore: *Wallich* (n. 1952).

This plant has never been seen in the Malay Peninsula since Wallich collected it. It appears to be fairly common in Borneo.

D. Cantleyi, Ridl., *i.e.*, *Arundina Cantleyi*, Hook. f., Fl. Brit. Ind., v. p. 858.

Hab. Perak: Gunong Bubu, alt. 4,000–5,000 feet, *Cantley*, *Wray*.

I believe I saw this out of flower on Kedah Peak.

Tribe *VANDEÆ.*

EULOPHIA, R. Br.

E. squalida, *Lindl., Bot. Reg.* (1841) *Misc.*, p. 77.

Hab. Singapore: common; Tanglin, Changi, Chan Chu Kang!
Johore: Sedili River! Batu Pahat! Kota Tinggi! Gunong Pulai.
Selangor: Bukit Kuda! Kwala Lumpur.

Common in open grassy spots near villages, orchards, &c.

E. elata, *Hook. f., Fl. Brit. Ind.*, vi. p. 3.

Hab. Perak: *Scortechini.*

E. graminea, *Lindl., Gen. et Sp. Orch.*, p. 182, *et in Wall. List*, n. 7372.

Hab. Singapore: Tanglin! Choa Chu Kang! Chan Chu Kang!
Johore: Batu Pahat!
Malacca: Merliman! Bukit Sabukor!
Pahang: Rampin River! Sungei Meang!
Lankawi: Coah! *C. Curtis.*

Common in sandy spots, especially near the sea. It is called "*Bawang Hanta*" by the Malays, lit., Ghost's onion, *i.e.*, onion-like plant that is not fit for human beings.

It is a very variable plant as regards size of bulb and development of panicle.

EULOPHIA KEITHII, *Ridl.*, *sp. nova.* *Pseudo-bulbi* 3–5 poll. longi, 1 poll. crassi, cylindrico-conici, virides, 6-nodi. *Folia* 2½ poll. longa, ⅓ poll. lata, graminea, acute carinata. *Scapus* 1 ped. longus, rigidus, gracilis, teres, basi (vaginis paucis exceptis) nudus, superne laxe racemosus. *Flores* usque ad 9, iis *E. gramineæ* majores, explanati, dissiti. *Bracteæ* ⅛ poll. longæ, lanceolatæ acutæ; pedicelli cum ovariis 1 poll. longi. *Sepala* ¾ poll. longa, ⅛ poll. lata, linearia, acuta, viridia. *Petala* sepalis breviora, latiora. *Labellum* latum, viride in disco albescens; lobi laterales breves curvi erecti falcati, medius ¼ poll. longus et latus late obovatus apice retusus crispus; nervi elevati, reticulati, brunei; carinæ in disco 3 undulatæ, a callo conico flavo terminatæ. *Calcar* ¼ poll. longum, clavatum, pendulum. *Columna* lata, rectiuscula, superne alata, in dorso complanata, viridis rubro-lineata. *Anthera* lata, apice bifida; lobi obtusi, recurvi, rubri.

Hab. Lankawi Isles, *C. Curtis!*
Siam: Bangtaphan, *Dr. Keith!*

This has the habit of *E. graminea*, Lindl., but the flowers are very different. The broad, reticulately-veined lip bears three thick white veins ending in a raised conical mass on the mid-lobe.

Dr. Keith says it grows in masses at the roots of trees.

CYMBIDIUM, Swartz.

C. **ALOIFOLIUM**, *Sw. in Nov. Act. Soc. Sc. Upsal.*, vi. (1799) p. 73.

C. Finlaysonianum, Lindl. in Wall. Cat., n. 7358.

Hab. Singapore: common on the island; also on Pulau Ubin, between Singapore and Johore!
Carimon Isles!
Johore: Tanjong Kopang! Batu Pahat!
Pahang: Pekan!
Malacca: common.
Penang: Telok Bahang, *Curtis!*
Perak: *Scortechini* (drawings).

Var. **PUBESCENS**, *i.e.*, *C. pubescens*, Lindl., Bot. Reg. (1840) Misc., p. 75; (1841), t. 38.

Hab. Singapore: Sungei Buluh!
Malacca!
Lankawi Islands, *Curtis!*
Siam: Bangtaphan! *Dr. Keith.*

As I have elsewhere mentioned, *C. pubescens*, Lindl., when typical, looks very different from *C. aloifolium*, Sw., but the two plants pass into each other, and it is really often hard to draw the line between them.

The var. *pubescens* is much less abundant than the very common *C. aloifolium*, which grows everywhere on trees, especially near the sea coast.

It is visited and fertilized by hornets, *Vespa cincta*, Fabr., and also by Carpenter bees, *Xylocopa*, spp.

CYMBIDIUM ACUTUM, *Ridl., sp. nova.* Cæspitosa. *Rhizoma* crassum. *Folia* 12 poll. longa, $\frac{1}{4}$ poll. lata, plurima, erecta, graminea. *Scapus* 6–8 poll. longus, erectus vel sub-erectus fructifer nutans. *Flores* pauci, $1\frac{1}{2}$ poll. in diam., remoti. *Bracteæ* breves, ovatæ, acutæ; pedicelli 1 poll. longi et ultra. *Sepala* 1 poll. longa, $\frac{1}{4}$ poll. lata, lanceolata acuta, albescentia a fasciâ medianâ purpureâ tincta. *Petala* sepalis breviora. *Labellum* sepalis brevius; lobi laterales longiusculi, obtusi, albescentes in margine nervisque kermesini; discus ochreus; carinæ 2 integræ apice crassiores; lobus medius ovatus, in margine sinuatus, mucronatus, atro-kermesinus, in medio a maculâ aurantiacâ ornatus. *Columna* recta, lata, in ventre plana, violaceo-purpurea. *Anthera* pileata, ochrea; margo anticus latus, retusus; pollinia triangularia, obovata; discus latus, transverse ellipticus, utrinque acutus. *Stigma* transversim oblongum, angustum. *Capsula* 3 poll. longa, fusiformis, rostrata; pedicellus $1\frac{1}{2}$ poll. longus, incrassatus.

Hab. Perak: Waterloo Estate, Kwala Kangsa Valley, *Sir Græme Elphinstone!* Thaiping Hills!

This is a very distinct plant, forming large tufts of narrow, grassy leaves, which are not articulated above the base as in *C. aloifolium*, Sw.

The scape is rather short and erect; the flowers smaller than in *C. aloifolium*, Sw., with nearly white sepals and petals, with a medium bar of purple. The lip has the form of *C. aloifolium*, but is differently coloured. It is a very distinct and pretty plant.

CYMBIDIUM LANCIFOLIUM, *Hook. Exot. Fl.*, t. 51.
Hab. Malacca : Bukit Sadanen !
Perak : *Scortechini.*

This grows on the ground in dense jungle. Plants flowered in the Botanic Gardens from Malacca had apple-green sepals and petals, the latter with a medium pink line and a white lip spotted and marked with deep crimson.

GEODORUM, Jacks.

G. PURPUREUM, *R. Br. in Ait. Hort. Kew.*, Ed. II. v. p. 207 ?
G. fucatum, Lindl., Bot. Reg., t. 1687 !
Hab. Malacca : Open fields at Rellau, at the base of Mt. Ophir ! Bukit Sadanen, *R. Derry !*

This exactly resembles Lindley's figure above quoted, which was based on a plant said to have been imported from Ceylon, and I believe *G. purpureum*, R. Br., l.c., is intended for the same species. A white-flowered plant with pink markings and a yellowish central blotch, collected in Pulau Hujong Duri, north of Lankawi, by Curtis, seems to me to be a white variety merely, though, according to a sketch, the apex of the lip is retuse.

I have also another form (apparently) which has yellowish flowers, with an acute lip veined with brown, from Saigon; and a somewhat similar form was found in Province Wellesley by Curtis.

G. CITRINUM, *Jacks. in Andr. Bot. Rep.*, t. 626.
Hab. Siamese Islands, north of Lankawi, *C. Curtis !*

GRAMMATOPHYLLUM, Blume.

G. SPECIOSUM, *Blume, Bijdr.*, p. 378 f. 20.
Hab. Singapore : Toas, Pulau Ubin !
Malacca : Tanjong Kling !
Selangor : Near Kwala Lumpur !
Perak : Dindings !
Pahang : Banks of Tahan River !
Kedah : On Kedah Peak, 3,000 feet alt. !

The numerous descriptions of this, the finest of East Indian orchids, leave little to be added. It is probably the largest species in the order. A plant was brought down from Malacca to Singapore which weighed, with the portion of the tree on which it grew, three quarters of a ton, and specimens in Penang and Singapore Gardens measure 40 feet in circumference. It grows on trees, rarely at any great height above the ground, and often over streams; but when the tree has fallen it often continues to live and grow on the ground. The flowering season is August or September; the scapes are very rapidly developed, and remain in flower for some weeks. Strong plants flower every year; but they require to be full grown before they commence. The capsule is very large, and pendulous; it is oblong pyriform, and about 6 inches long and 3 inches thick.

The flowers vary in size in different parts of the raceme, the lowest being the largest. The column is described in the 'Genera Plantarum' and 'Flora of British India' as footless, but this is hardly so. The margins at the base are carried forward beyond the point of attachment of the column to the ovary, so as to form a nectary a quarter of an inch deep, in which, however, I have never seen any nectar. The front wall of this nectary is formed by the base or claw of the lip, which is adnate to the sides, and on this base the lamina of the lip is articulated, and is, to a certain extent, movable.

The flowers are fertilized by two species of *Xylocopa*, viz., *X. latipes*, Drury, and *X. æstuans*, Linn.

They are also visited by ants and other small-winged hymenoptera in search of the sweet exudation, not only from the flowers but also from the bases of the pedicels.

Each flower remains open for a few days without any alteration unless fertilized, when, although it is still unwithered, a change takes place which prevents its ever being fertilized. The apex of the column begins to curve over towards the stigma, pressing down the rostellum and pushing aside the side lobes (stelidia). The disc of the pollen and the anther become black and show signs of decay. The red spots on the upper part of the column become paler, and the whole column more greenish coloured. The lip becomes duller and withers. In a few days the apex of the column is coiled up almost into the stigma, pressing the pollinia into the stigmatic mouth. Then the whole flower commences to droop and wither.

I believe that there is actual growth of the column apex, and this is borne out by the alteration in form of the spots on the upper part of the column, which appear to lengthen as the column curves over.

Removal of the pollinia does not arrest this growth.

The same growth takes place after fertilization, but much more rapidly. On November 27th, at 11 a.m., I fertilized two flowers with the pollen of each other. Next day, at 8.30 a.m., the column was distinctly curved over and nearly concealed the stigma, and by noon the curving into the stigma was complete. Meanwhile the lower flowers on the raceme, which had been open for some days, had not commenced to alter at all.

All the flowers I fertilized set fruit, but those which were not so treated never did so, although their own pollen was pushed into the stigma by the incurving of the column.

I compared with this the action in the allied genus *Cymbidum*. In an unfertilized flower of *C. aloifolium*, Sw., the column merely withers up and does not alter at all; but on fertilization a rapid change takes place. The column increases to double its width—from 4½ mm. to 9 mm., and at the same time shortens about 2 mm. The part that enlarges is chiefly the front wall (*venter*). The whole length of the column is thus modified, and not merely the upper part, as in *Grammatophyllum*.

In the latter orchid cross-fertilization is absolutely necessary, and that within a few days after the flower opens. Accidental self-impregnation destroys the flower by setting up at once the growth of the column, which almost immediately prevents any possibility of any cross-fertilization by covering the stigma, and is itself incapable of producing fertilization. The advantage of the incurving of the column after fertilization is obvious; for if, as often happens, the pollinia are not placed exactly on the stigmatic surface, the apex of the column forces them well into the stigma and covers them up in it. At the same time, the action in the unfertilized plant is absolutely injurious, for thereby the flower is rendered unable to set seed long before it is withered.

In *Cymbidium*, on the other hand, this action only commences on impregnation, so that the flower is fertilizable till it withers, while the full advantage of the incurving of the column in pressing the pollinia into the stigma is received by the flower.

At the base of the scapes in *Grammatophyllum*, there are always five or six monstrous flowers, the lowest quite at the base, the upper ones much more distant from each other than are the normal ones above. These monstrous flowers are quite sterile. They consist of two pairs of perianth segments, distinctly, though shortly, separated from each other, and exactly alternate, and a rudimentary column. The perianth segments of each pair are exactly opposite each other. They are longer, and narrower in proportion to their length, than those of the normal flowers (being 3 inches long by 1½ inches broad, as opposed to 2 inches by 1¼ inches), and they are also much duller in colouring. The column faces one of the lower pairs, *i.e.*, it alternates with the upper pair. It is very much thinner laterally than that of a normal flower; and the broad front face is reduced to a sharp edge. The upper part is clubbed. There is no trace of an anther; but in one or two specimens I have seen a narrow linear process rising from the centre of the back of the column which is possibly a rudimentary filament. The stigma is very small, and almost entirely closed over, a minute hole only being visible on the front face. A section of the ovary shows four lobes, corresponding to the four perianth segments; and each has a single fibro-vascular bundle passing through it, except the front one, which has several bundles, and is indeed broader than the other lobes. One of these bundles supplies the front segment, the other the column.

The foot of the column is well marked in all the monstrous flowers, but it is thin. There is no nectary, and no trace of the base of the lip.

Another monstrous flower consisted of two perianth segments only, very much smaller than those of the ordinary abnormal ones. These segments were opposite and distinctly separated, oblong obtuse.

DIPODIUM, R. Br.

D. PICTUM, *Reichb. f.*, *Xenia Orch.*, ii. p. 15 t. 107.
Hab. Singapore: common; Kranji, Chan Chu Kang! &c.
Selangor: Klang!
Malacca: common!
Pahang: Tahan Woods!

This is quite a common plant, but very seldom flowers. It grows on the ground, ascending small trees, and clasping them quite round with its roots. It would be well worthy of cultivation if it were not such a shy flowerer, as the racemes are long and the flowers showy.

D. PALUDOSUM, *Reichb. f.*, *Xenia Orch.*, ii. p. 15.
Hab. Malacca: Ayer Panas!
Perak: *Wray.*

A much rarer plant than the preceding.

Both species occur also in Borneo.

BROMHEADIA, Lindl.

B. PALUSTRIS, *Lindl.*, *Bot. Reg.* (1841) *Misc.*, p. 89.
Cœlogyne caulescens, Griff., Notul., iii. p. 282.

To the localities given for this in the 'Journal of the Linnean Society,' xxviii. (1891) p. 337, I can add now Johore, at Batu Pahat! and on Gunong Panti! Perak, in the Dindings! and at Thaiping Waterfall! Kedah, on Kedah Peak! and Legeh, at Tomoh! These last two are the most northern localities I have any record of.

The specimen of *Cœlogyne caulescens*, Griff. in Herb. Lindl., consists of a portion of stem and rhachis of this plant, with two leaves of a *Dracæna*, probably *D. terniflora*, Roxb.

B. SYLVESTRIS, *Ridl. in Journ. Linn. Soc.* (*Bot.*), xxviii. (1891) p. 337.

Again met with on Gunong Panti, in Johore, at 2,000 feet elevation.

B. ALTICOLA, *Ridl. in Journ. Linn. Soc.* (*Bot.*), xxviii. (1891) p. 338.

Occurs also on Mt. Ophir, in Malacca; and on the Tahan River, in Pahang.

BROMHEADIA APOROIDES, *Reichb. f.*, *Otia Bot. Hamb.*, p. 44. Occurs on Mt. Ophir, and on Hermitage Hill, in Perak. There is a sketch of it among Scortechini's drawings.

I have three more species to add to this genus.

B. (§ EPIPHYTICÆ) PUNGENS, *Ridl.*, *sp. nova.* *Caules* 6–8 poll. longi, complanati, per totum longitudinem foliati. *Folia* 4 poll. longa, ½ poll. lata, disticha, ensiformia, complanata, rigida, pungentia, læte viridia. *Racemi* 1 poll. longi, a bracteis lanceolatis acutis bruneis fere omnino tecti. *Flores* explanati 1½ poll. lati; pedicelli 1½ poll. longi. *Sepala* 1½ poll. longa, lanceolata acuta, flavescentia. *Petala* sepalis angustiora, alba. *Labellum* oblongum, album; lobi laterales obscuri; lobus medius explanatus crispo-marginatus, apice rotundato-emarginatus, basi canaliculatus, in medio a callo crasso lobato flavo ornatus. *Columna* ferme recta, superne incrassata, in ventre plana virescenti-flava. *Anthera* oblonga, plana, apiculata, bilocularis, flavescens; pollinia elliptica, pallida; discus semilunaris. *Stigma* transversim ellipticum.

Hab. Malacca: On trees at Mt. Ophir, 4,000 ped. alt.

This is even more like an *Aporum* than *B. aporoides*, Reichb. f. The leaves are much longer and more pungent than in that species, and the lip is quite different in shape, the lateral lobes being very obscurely marked.

I brought live plants from Mt. Ophir, where it appears rare, and flowered them in the Botanic Gardens at Singapore.

B. BREVIFOLIA, *Ridl.*, *sp. nova.* Epiphytica. *Caules* plures, 6–8 poll. longi, congesti, complanati, per totam longitudinem foliati. *Folia* ½ poll. longa, ¼ poll. lata, lanceolata acuta, disticha, striata, coriacea, atroviridia; vaginæ striatæ, breves. *Flores* ½ poll. longi, e fasciculis bractearum terminales. *Ovarium* cum pedicello recto ¼ poll. longum, rubrum. *Sepala* ½ poll. longa, ⅛ poll. lata, lanceolata acuminata acuta, rosacea. *Petala* sepalis breviora, lanceolata, albescenti-flava. *Labellum* cum petalis subæquilongum; lobi laterales lati, curvi, falcati, acuti, basi fasciculatim pilosi, albescenti-flavi; discus purpureo-punctatus; lobus medius ovatus, albus in medio flavus. *Columna* gracilis, alba; clinandrii margo bilobus. *Capsula* ultra ½ poll. longa, a columnâ marcidâ coronata, ferme sessilis, superne incrassata; costæ fertiles sterilibus triplo latiores, in dorso teretes.

Hab. Perak: On a fallen tree, Hermitage Hill!
Also Borneo: Sarawak, *Dr. Haviland!*

This has the stem and leaves of some species of *Aporum*, such as *Dendrobium* (§ *Aporum*) *sinuatum*, Lindl., and rather small reddish-yellow flowers springing from a tuft of dry bracts at the end of the stem.

BROMHEADIA RUPESTRIS, *Ridl.*, *sp. nova.* Terrestris. *Caules* 5 ped. longi, ⅜ poll. lati, complanati. *Folia* 4 poll. longa, ¾ poll. lata, lorata, lanceolata, apice inæqualiter biloba rotundata, canaliculata, carinata, tenuiter coriacea, atro-viridia; vaginæ ¾ poll. longæ. *Flores* laterales nec terminales, 2–3 in caule uno dissiti, singulatim expansi, subcarnosi. *Ovarium* cum pedicello ½ poll. longum. *Sepala* 1 poll. longa, ¼ poll. lata, lorata, lanceolata obtusa, pallide flava rubro-tincta, nitida. *Petala* sepalis paullo breviora latiora, lanceolata, pallide citrina. *Labellum* cum sepalis ferme æquilongum; lobi laterales longi falcati acuti paullo elevati albi kermesino-nervosi, medius carnosior lanceolatus flavescens kermesino-punctatus in margine crispo-involutus; hypochilii flavescentis discus a fasciâ medianâ elevatâ ornatus. *Columna* semiteres, flava, paullo curva, in ventre excavata rubra; clinandrium profundum in margine rotundatum.

Hab. Malacca: on rocks on Gunong Mering, a spur of the Ophir range, 4,000 feet alt.!
Kedah: Kedah Peak, 3,000 feet alt.!

This plant is remarkable for being the only species with lateral, not terminal, flowers. It forms a large tuft, with several tall stems, 5 feet or less in height. The lower leaves fall off as the stem grows, so that the lower part is bare of all but the sheaths. The leaves are thicker than usual in the genus, and when dry are dark brown, wrinkled, and polished. The apices are very unequal, one being one-eighth of an inch longer than the other.

The flowers are rather fleshy, and, like those of the rest of the genus, do not preserve well. The sepals and petals are pale yellow tinted with red. The lip has the lateral lobes white with a few red streaks and spots, on the disc between them is a honey-coloured raised portion. The mid-lobe (epichil) is more fleshy in texture, honey-coloured with crimson dots, its sides are rolled up so as to meet in the middle line.

Though the position of the flowers is quite unlike that of the other species, yet as the plant sufficiently resembles in habit the others, and the flower has just the same structure, it cannot be referred to any other genus. Of all the species it is nearest to *B. alticola*, Ridl.

LEUCOLENA, Ridl.

L. ORNATA, *Ridl. in Journ. Linn. Soc. (Bot.)*, xxviii. (1891) p. 340, t. 43.

Hab. Malacca: Bukit Sadanen!

POLYSTACHYA, Hook.

Polystachya is one of the very few epiphytic genera of orchids which are common to both hemispheres. The headquarters of the genus appears to be Africa. There are but few species in the East Indies; but there are a number in the New World. The Malayan species are not only few in number but always scanty in individuals, so that it is not easy to get a good series of specimens for comparison. Three species are mentioned in the 'Flora of British India'; two of these, *P. Wightii*, Reichb. f., and *P. purpurea*, Wight, belong to the simple-racemed series, and are apparently closely allied to *P. luteola*, Hook. To these I have added *P. singapurensis* and *P. siamensis*. The latter much resembles *P. luteola*, Hook., if I am correct in referring to that species a plant I formerly collected in Pernambuco; and it even more resembles a specimen received from Dublin Gardens, having been imported from Trinidad. It is quite possible that all these species, together with some others from the African region, will eventually be reduced to a single one. The chief differences lie in the form and proportions of the lip.

P. penangensis, sp. nov., belongs to the *P. zeylanica* group with a longer branched panicle. The development of the panicle is not a good sectional character, as there are intermediate forms between the simple raceme and panicled inflorescence in the African region. I am very doubtful as to the affinities of the genus, but as the pollinia usually at least possess an oblong pedicel, it is perhaps best to retain it in the neighbourhood of *Cymbidieæ*. All are probably self-fertilized, as some species undoubtedly are, and this makes the form of the pollen masses and their pedicel often difficult to make out, for fertilization has begun before the flower opens.

POLYSTACHYA SINGAPURENSIS, *Ridl., sp. nova.* *Radices* crassæ. *Pseudo-bulbi* ¼ poll. longi, vetusti globosi, arcte approximati. *Folia* 2–4, usque ad 4 poll. longa 1 poll. lata, inæqualia lorata, apice inæqualiter biloba, læte virentia. *Racemus* 2 poll. longus, anceps, a vaginis papyraceis dissitis fere usque ad flores tectus; rhachis pubescens. *Flores* pauci, parvi, flavo-virentes. *Bracteæ* cum ½ parte pedicelli æquilongæ, ovatæ acuminatæ, virides. *Sepala* bullata, posticum lanceolatum, lateralia triangularia. *Petala* sepalis paullo breviora, anguste spathulata. *Labelli* lobi laterales longiusculi lineares falcati acuti, medius ovalis margine involutus apice subacutus decurvus, præter basin roseam flavescens, intus pulverulentus. *Columna* brevis, apice rosea; pes longus. *Anthera* galeata, obtusa, ferme bilocularis; margo anticus profunde emarginatus, quasi bilobus; pollinia 4, semiglobosa, pulverulenta; rostellum nullum. *Stigma* magnum.

Hab. Singapore: Sungei Morai, on old low trees on the edge of a mangrove swamp, rare!

This plant I find to be cleistogamous. The rostellum being absent, the pollinia slip easily into the stigmatic cavity. The lip is longer than broad, and the mid-lobe is considerably longer than the narrow falcate lateral lobes. The plant is allied to *P. purpurea*, Wight; but that is said to have purple flowers, and only a short median ridge furfuraceous on the lip; whereas, in *P. singapurensis*, the whole of the lip is mealy within.

P. SIAMENSIS, *Ridl., sp. nova.* *Pseudo-bulbi* ½ poll. longi, conici, vetusti approximati. *Caulis* supra pseudo-bulbum ½ poll. longa. *Folia* usque ad 5 poll. longa, ½ poll. lata, lineari-lanceolata, disticha, inæqualia, apice inæqualiter biloba. *Racemus* vix 4 poll. longus; pedunculus anceps, a vaginis arcte appressis tectus. *Flores* c. 15, parvi, virides. *Bracteæ* minimæ, basi ovatæ, apice subulatæ. *Pedicellus* cum ovario ¼ poll. longus. *Sepala* prasina, posticum ovato-lanceolatum, lateralia postico multo majora triangularia acuta. *Petala* sepalis multo minora, cuneata, acuta, alba. *Labellum* obovatum, undique farinosum, album; lobi laterales parvi angusti falcati obtusi, medius rotundatus apice breviter bifidus, margine sinuatus. *Columna* brevis; pes longiusculus, canaliculatus; clinandrium vix depressum. *Anthera* lata, ovata, obtusa, margine antico recto integro; pollinia 4, elliptica; discus oblongus, tenuis. *Rostellum* planum, latum, bifidum.

Hab. Siam: Pungah, *C. Curtis!*

This plant has much the habit and appearance of the Singapore species, *P. singapurensis*, but differs in the sepals not being bullate, and in the form of the lip, which in this species has much shorter lateral lobes, and a broader rounded mid-lobe with sinuate edges.

POLYSTACHYA PENANGENSIS, *Ridl., sp. nova.* *Pseudo-bulbi* 1 poll. longi, conici. *Folia* 5, 4 poll. longa, 1½ poll. lata, lanceolata subacuta, disticha, inæqualia, apice inæqualiter biloba. *Panicula* 6 poll. longa, stricta, erecta; vagina basalis 2 poll. longa; rami 1 poll. longi. *Bracteæ* cum ½ parte ovarii æquilongæ, lineari-setaceæ. *Flores* parvi, bullati, flavescenti-virides. *Sepalum* posticum lanceolatum acutum, lateralia triangularia acuta. *Petala* sepalis multo minora pallidiora, spathulata, obtusa. *Labelli* lobi laterales breves ovati falcati, medius vix longior ovatus obtusus intus pubescenti-flavus, in medio bruneo-lineatus. *Columna* brevis, crassa. *Anthera* lata, oblonga; pollinia globosa. *P. zeylanica*, Lindl., Bot. Reg. (1838) Misc., p. 78, pro parte?

Hab. Penang: Government Hill!

This is allied closely to Lindley's *P. zeylanica*, and may indeed be perhaps eventually reduced to a form of the Ceylon plant. The lip, however, seems to me different in form. Lindley's description, l.c., included both the Ceylon species and the *Dendrobium polystachys*, Thou., Orch. Afr., t. 85, that is, *Polystachya mauritiana*, Spreng., Syst., iii, p. 742.

SUBTRIBE *SARCANTHEÆ*.

This large section of *Vandeæ* is a clearly-marked one; distinguished by its habit, absence of pseudo-bulbs, coriaceous narrow leaves, and lateral inflorescence. I would, however, exclude from it the South American genera *Lockhartia* (an *Oncidea* with the habit of an *Aporum*) and *Centropetalum* and *Pachyphyllum* (though the former of these has certainly the habit of *Adenoncos*), which seem to me to form a distinct group. The section thus curtailed is, with the exception of two American genera, closely allied to *Angræcum* (*Dendrophylax*

and *Campylocentron*), confined to tropical and subtropical Asia, and to Africa. The section can be subdivided into the *Ecalcaratæ* and *Calcaratæ;* according to the presence or absence of a spur; and the latter again according to the presence or absence of a foot to the column.

Of the spurless genera *Luisia*, *Cottonia*, *Adenoncos* (which, by some accident, has been mixed up in some books with *Microsaccus*, a genus closely allied to *Saccolabium*, if, indeed, it should not be merged in it) form a group characterised by the narrow, nearly entire, flat lip. *Luisia* is distinguished by its terete leaves; *Adenoncos* has them narrowly lanceolate and *very thick;* and *Cottonia* has the broader, flattened leaves common to many other genera in the section. *Esmeralda* is a good genus, with a spurless lip, two small lateral lobes, and a broad epichil. *E. Cathcarti*, Reichb. f., Xenia Orch., ii. p. 39, and *E. Clarkei*, Reichb. f., Gard. Chron. (1886) II. p. 552, belong to it; and I am inclined to refer to it also *Vanda Sanderiana*, Reichb. f., on account of the peculiar form of the lip, which is very unlike that of a typical *Vanda*, and much more like that of *Esmeralda*. *V. cristata*, Lindl., and *V. alpina*, Lindl., are certainly nearer to *Esmeralda* than to *Vanda*.

Stauropsis, Reichb. f. in Hamb. Gartenz., xvi. (1860) p. 117 (Xenia Orch. ii. p. 7 ?), was a genus founded by Reichenbach to include *Trichoglottis pallens*, Lindl., from Manila, a little-known plant; *S. violacea*, Reichb. f. (possibly *Phalænopsis violacea*, Teysm. and Binn.); and *Trichoglottis philippinensis*, Lindl., one of Cuming's Philippine plants. To these Bentham added (Benth. and Hook., Gen. Pl., iii. p. 572) *Fieldia lissochiloides*, Gaudich., *Vanda gigantea*, Lindl., *Vanda undulata*, Lindl., and *Trichoglottis fasciata*, Reichb. f.

The original three seem to belong to the genus *Phalænopsis*; while, of the remainder, *Fieldia* and *Vanda gigantea*, Lindl., with probably *V. undulata*, Lindl., form a good genus, characterised by the fleshy trilobed lip with erect short lateral lobes, and a callus at the base of the epichil with a depression in the middle of the lip and short stout column. Gaudichaud's name, *Fieldia*, is preoccupied, so that another name is wanted for this genus; and I would suggest that Bentham's generic name of *Stauropsis* should be retained for this.

Trichoglottis fasciata, Reichb. f., differs from *Trichoglottis*, Blume, in the absence of a spur, and from *Stauropsis* in the spreading lateral lobes of the acute terminal lobe, and the absence of calli. The habit is that of *Esmeralda Clarkei*, Reichb. f. It is so distinct from all other genera known to me that it should, I think, form the type of a distinct genus, and for this plant I would suggest the generic name of STAUROCHILUS, alluding to the cross-shaped lip.

The remaining genera of spurless *Sarcantheæ* are *Phalænopsis*, *Doritis*, and *Diploprora*.

In *Acampe*, which has sometimes been referred to the genus *Saccolabium*, the spur is really so slightly developed that some of the species might well be referred to the spurless group. I do not see any good reason for merging it in *Saccolabium*, as has been done in the 'Flora of British India.'

Sarcantheæ Calcaratæ.

I have classed as spurred Sarcanths, all in which the labellum is so depressed that a protuberance is formed on the under side, *i.e.*, the morphological under-side. The dimensions, form, and position of the spur vary very much in the different genera. The greater part of the East Indian species, being fertilized by Diptera or Hymenoptera, have short spurs, while those of Africa and America, being fertilized by Lepidoptera, have long spurs.

It would appear at first sight that the position of the spur, *i.e.*, whether epichilary or hypochilary, would be of value in classifying the genera, but I have found it often so difficult to determine where the hypochil ends and the epichil begins that I am quite unable at present to utilise this as a differential point.

The variations in the direction of the spur in the open flower are very remarkable. In *Trichoglottis* and *Rhynchostylis* it points backwards in a horizontal direction, parallel to the plane of the lamina of the lip, and at right angles to the column. In *Renanthera* and *Saccolabium* it is vertical; while in *Sarcochilus* it points forwards, lying in a plane at right angles to the column.

The whole section can be divided into those which have a foot to the column and those which have not; the latter include the larger number.

The subsection *Apodæ* includes the *Renanthera* group, *Renanthera*, *Renantherella*, *Vanda*, with large or conspicuous flowers and a short, usually vertical, spur; *Rhynchostylis* and *Pelatantheria*, with a horizontal laterally flattened broad spur; *Trichoglottis*, with a terete horizontal spur; and the *Saccolabium* group, with small flowers, with usually a comparatively small epichil and a longer or shorter dependent spur. This includes *Saccolabium*, *Schœnorchis*, *Microsaccus*, *Tæniophyllum*, *Cleisostoma*, *Sarcanthus*, and *Cryptochilus*. These genera are all somewhat closely allied, and it might perhaps be more satisfactory to merge some of them in *Saccolabium*. From this latter genus I have excluded *Acampe* for reasons given above. The other sections, as laid down in the 'Flora of British India,' I have retained. The first four genera have no callus, either epichilary or hypochilary, on the lip. The greater number of the *Saccolabium* have a small, often minute, epichil, but the section *Calceolaria* (which might perhaps be kept as a distinct genus) has a large, rounded epichil, and the lateral lobes meet in the middle line so as to wall off the epichil from the broad, basin-shaped spur. *Schœnorchis* is a *Saccolabium*, with well-developed stelidia, *Microsaccus* and *Tæniophylla* more distinct in habit than anything else. In *Cleisostoma* and *Sarcanthus* there are well-developed calli. The distinctions between the two genera are laid down under *Cleisostoma*. *Cryptochilus* is a remarkable plant, which stands quite alone.

The remaining group of this subsection is that of the *Angræca*, none of which occur in our region as far as is yet known. Nearly all are long-spurred, with an entire lip (except *Cryptopus* and one or two *Angræca*), and many have the pollinia on separate pedicels, which rarely, if ever, occurs in the other groups.

The *Sarcantheæ calcaratæ*, with a foot to the column, include the genus *Aërides* and several others included under the polymorphic genus *Sarcochilus*, which, however, has been broken up into sections by several authors, of which clearly the following, at least, should be kept distinct generically, *Cuculla*, *Fornicaria*, and *Tubera*.

Cuculla has a compressed rhachis with persistent distichous bracts and a saccate lip. The oldest generic name for any species included in it is Loureiro's *Thrixspermum*, which name I propose to retain for it. A very curious and rare little plant was described in the 'Flora of British India' as the representative of a new section, *Ridleya*; a rather puzzling plant, as it has an evident affinity with *Thrixspermum*, but has the short stem of a *Sarcochilus*, an entire lip, and apparently no foot to the column, to which the sides of the lip are adnate. I believe that in reality the column has a foot, but it is adnate to the sides of the lip, and, excepting by the arrangements of the nerves, is indistinguishable from it. Perhaps it would be best to leave it as a distinct genus, as Sir Joseph Hooker appears inclined to do.

Fornicaria has a thickened terete rhachis with persistent quaquaversal ovate acute bracts. The lip is saccate, with a small epichil (usually), and the side lobes are often rolled up so as to give the lip a trumpet shape.

The oldest name for any species of this genus is Blume's *Dendrocolla*, which, however, included *Thrixspermum* as well. Reichenbach's *Grosourdya*, Bot. Zeit., xxii. (1864) p. 297, was made to include several of this section, but the type of the genus, *G. elegans*, seems to be a very different plant. Thwaites's *Cylindrochilus*, Enum. Pl. Zeyl., p. 307, belongs to the same genus, but it will cause less change to adopt Blume's old name.

In these genera the rhachis of the inflorescence grows very slowly, the flowers opening at considerable intervals of time, so that as much as a week may elapse between the opening of two consecutive flowers, and the whole inflorescence may take months to develop all its flowers. The blossoms are very fugacious, so that it is impossible for one to be fertilized by another on the same raceme.

Sarcochilus I would propose to retain for the section *Tubera*, Blume, and of the 'Genera Plantarum' for the most part, to include all the species with a long foot to the column, a porrect spur, with a small, often fleshy, epichil.

ASCOCHILUS I would propose as the name for a small genus in which the column has a very long foot, on the end of which is borne the lip, far from the body of the column. The spur is pendulous, rather long, with large lateral lobes, and a well-developed, sometimes bilobed epichil.

In these two genera the inflorescence usually, at least, develops rapidly, so that several flowers may be open at once, and frequently all are open on the same day.

Stereochilus, Lindl., *Micropera*, Lindl. (*Camarotis*, Lindl.), *Chiloschista*, Lindl., seem to me distinct. They do not occur in our region as far as is at present known.

LUISIA, Gaudich.

L. TRISTIS, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 25.
Hab. Penang: Penara Bukit, *Curtis !*

Sepals white, blotched with pink. Petals white, tipped rose. Lip deep blackish purple, with a whitish V-shaped line between the oblong narrow hypochil and the much broader ovate epichil.

L. ANTENNIFERA, *Blume*, *Rumphia*, iv. p. 50.
Hab. Pahang: Pulau Chengi, Pahang River !
Perak: *Scortechini.*

Climbing on branches of low bushes, or small trees in thickets in open country.

L. BRACHYSTACHYS, *Blume*, *Rumphia*, iv. p. 50.
Hab. Siam: On trees by the river at Ghirbee, *Curtis !*
Lankawi Isles: *Curtis !*

Sepals and petals greenish with violet edges; lip violet purple.

L. TERETIFOLIA, *Gaudich.*, *in Freyc. Voy. Bot.*, p. 427 t. 37.
Hab. Siam: Bangtaphan, *Dr Keith !*

ADENONCOS, Blume.

A. VIRENS, *Blume*, *Bijdr.*, p. 381. Humilis, 2–6-pollicaris. *Caules* suberecti. *Folia* 1 poll. longa, $\frac{1}{8}$ poll. lata, lineari-oblonga acuta, superne sulcata, carnosa, recurva, rugosa; vaginæ vetustæ transversim rugosæ. *Racemi* brevissimi, 3–4-flori, flexuosi. *Flores* parvi, virides, odorati, explanati. *Bracteæ* $\frac{1}{16}$ poll. longæ, ovatæ; pedicelli $\frac{1}{16}$ poll. longi. *Sepala* lanceolata acuminata, lateralia subfalcata. *Petala* sepalis breviora angustiora; sepala petala læte viridia. *Labellum* integrum, late cordatum, subacutum, carnosulum, viride, basi a callo oblongo granulato auctum. *Columna* brevis, crassa, alba; stelidia parva, obscura; clinandrium haud profundum. *Anthera* unilocularis, galeata, apice prolongata; pollinia 4, globosa, flava; caudiculus linearis, ad discum ovatum majusculum junctus; rostellum brevissimum. *Stigma* grande, oblongum. *Microsaccus virens*, Hook. f., Fl. Brit. Ind., vi. p. 77.

Hab. Singapore: Kranji, &c.! Common on trees in mangrove swamps.
Selangor: Pataling, near Kwala Lumpur!
Perak: *Scortechini.*
Also occurs in Java.

This little plant is common on mangroves, and occurs also in damp forests, on branches of trees. It has a strong scent of Friar's Balsam.

The leaves described as trigonous are only so when the plant is dried. During life they are very thick and deeply channelled above, but not really trigonous. The lip is quite entire; I see no trace of the short lateral lobes of the other species. At the base is a low oblong mass of papillæ. The anther is helmet-shaped, with a distinct blunt beak. The pollinia are not sessile on the pedicel, but each pair is borne on a short, distinct stalk, which is affixed to the pedicel a short way from the end. The stigma is very large and occupies nearly the whole of the face of the very short column.

ADENONCOS MAJOR, *Ridl., sp. nova.* *Caules* 6–10 poll. longi, subflexuosi. *Folia* 2–3 poll. longa, $\frac{3}{8}$ poll. lata, lorata, obtusa, carnoso-coriacea, apice inæqualiter biloba; vaginæ $\frac{1}{4}$ poll. longæ, rugosæ. *Flores* sessiles, axillares, singuli, virides. *Bracteæ* 3, ovatæ, coriaceæ, ovaria tegentes. *Sepala* $\frac{1}{4}$ poll. longa, ovato-lanceolata acuta. *Petala* sepalis multo minora, linearia, acutæ. *Labellum* cuneatum, obovatum, carnosum; lobi laterales minuti, medius apice rotundatus obtusissimus excavatus, carinæ basi papillosus, sub apice parvi-mucronatus. *Capsula* $\frac{1}{4}$ poll. longa, oblonga; costæ fertiles latæ, sterilibus latiores.

Hab. Johore: Batu Pahat!
Pahang: Kota Glanggi, on limestone rocks!
Kedah: Kedah Peak!

This much resembles *A. vireus*, Blume; but the whole plant is very much larger, the leaves broader, longer, and of a different shape. The lip is rounded at the apex, and has distinct though minute lateral lobes. The petals, too, are much narrower. The sepals and bracts are full of bundles of white raphides.

A. PARVIFLORA, *Ridl., sp. nova.* *Caules* 2–4 poll. longi, suberecti, per totam longitudinem foliati; radices tenues. *Folia* 1 poll. longa, linearia acuta, crassa carnosa, in dorso convexa, superne canaliculata, recurva; vaginæ rugosæ. *Flores* minimi, sessiles. *Bracteæ* minimæ, ovatæ. *Sepala* vix $\frac{1}{8}$ poll. longa, ovato-oblonga acuta. *Petala* sepalis breviora angustiora, linearia; sepala petala ochrea. *Labellum* sepalis brevius, ovatum acutum, carnosum; lobi laterales breves obtusi erecti, medius ovatus acutus excavatus atro-purpureus. *Columna* brevissima, crassa, alba; clinandrii margo haud elevatus. *Rostellum* bilobum; lobi paralleli, rotundati. *Capsula* $\frac{1}{4}$ poll. longa, elliptica, a perianthio marcido coronata; costæ ferme æquales.

Hab. Selangor: Kwala Lumpur, on trees at the limestone caves, *H. J. Kelsall!*

This curious little plant seems a connecting link between *Luisia* and *Adenoncos.* The leaves are very narrow and fleshy, so as to be nearly terete. The lip has two little auricular lateral lobes and an obscure distinction between the hypochil and epichil. It has also the deep purple colour of that of most of the *Luisiæ*; in other respects it resembles the other *Adenonci.*

STAUROPSIS, Reichb. f.

S. GIGANTEUS, *Benth. ex Hook. f.*, *Fl. Brit. Ind.*, vi. p. 27.

Hab. Lankawi Islands: *C. Curtis!*
Siam: Tonka! (*Native collector*); Pulau Rendong! Pungah, *Curtis.*

Collectors say this plant grows on the rocks. The stem is much shorter than that of *S. lissochiloides*, Pfitzer, which attains a height of over 6 feet. Mr. Curtis saw a plant at Pungah with 50 flower spikes.

STAUROCHILUS, Ridl., gen. nov.

S. FASCIATUS, Ridl. *Trichoglottis fasciata*, Reichb. f. in Gard. Chron. (1872) p. 699.

Hab. Siam: Tonka! Pulau Rendong! (*Native collector.*)
Lankawi: Terutan, *C. Curtis!*

It is commonly stated in horticultural books that this is a native of the Philippines. I have not seen any thence. It is often cultivated in Singapore on trees, where it climbs like a *Renanthera* and flowers annually. The flowers last a long time and are very sweetly scented.

PHALÆNOPSIS, Blume.

P. Cornu-cervi, *Blume et Reichb. f. in Hamb., Gartenz.,* xvi. (1860) p. 116.

Hab. Selangor: Telebu, *Davison!*
Perak: *Scortechini.*
Siam: Bangtaphan, *Dr. Keith!*

P. violacea, *Teysm. et Binn. in Tijdschr. Nederl. Ind.,* xxiv. (1862) p. 320.

Hab. Perak: Kinta district!
Also occurs in Borneo and Sumatra.

The locality, Singapore, given (Warner, 'Orch. Album,' iv. t. 182) must be a mistake, the plant being imported here. The figure represents the *var.* Murtoni.

I have seen two examples of a hybrid found in a wild state in Perak, between this and the last.

P. sumatrana, *Korth. et Reichb. f. in Hamb. Gartenz.,* xvi. (1860) p. 115.

P. zebrina, Teysm and Binn., Pl. Cult. in Hort. Bogor., p. 320.

Hab. Johore: Batu Pahat (*Native collector!*)

P. muscicola, *Ridl. in Trans. Linn. Soc.,* Ser. II. (*Bot.*) iii. (1893) p. 373.

Hab. Pahang: Tahan River!

P. Kunstleri, *Hook. f. Fl. Brit. Ind.,* vi. p. 30.

Hab. Perak: *Kunstler!*

P. fuscata, *Reichb. f. in Gard. Chron.* (1874) ii. p. 6.

Hab. "Malayan Peninsula": Hort. Bull.

I know no more than the somewhat inadequate description quoted above.

P. Esmeralda, *Reichb. f. in Gard. Chron.* (1874) ii. p. 582.

Hab. Lankawi Islands: *C. Curtis!*
Kedah: Setul, *Dr. Ellis!*

P. alboviolacea, *Ridl. in Trans. Linn. Soc.,* Ser. II. (*Bot.*) iii. (1893) p. 373.

Hab. Lankawi Islands: *Curtis!*
Pulau Tioman: *W. Nanson!*
Malacca: Bukit Bankong, *R. Derry!*

RENANTHERA, Lour.

R. Arachnites, *Lindl., Gen. et Sp. Orch.*, p. 217.
Arachnanthe moschifera, Blume, Rumphia, iv. p. 55, t. 196, 199.
Hab. Perak: Kinta!

This is sometimes called by the Malays "*Angrek Bunga Kasturi*," *i.e.*, musk-flower orchid, from the strong musky smell emitted by the upper sepal.

Neither in this nor any other species of the genus have I ever found the labellum "mobile" or "elastic," at least not more so than in *Vanda* or *Stauropsis*.

R. Maingayi, *Ridl.* *Arachnanthe Maingayi*, Hook. f., Fl. Brit. Ind., vi. p. 28.
Hab. Johore: Batu Pahat, *Lake and Kelsall!*
Malacca: *Maingay.*

This fine species is well known to the residents of Singapore as the spider orchid, and has long been in cultivation there. There is a mass of it in one of the trees in the Singapore Botanic Gardens, measuring about 8 feet through.

It flowers several times in the year. The flowers are rather smaller than those of *R. Arachnites*, Lindl., and quite scentless. The petals and sepals are white, more or less thickly barred with dark pink. The lip is also thickly striped with crimson, often nearly entirely self-coloured except for a buff stain in the centre and a buff spot on each side lobe. The anther is conical, blunt, not much taller than the margin of the clinandrium, with an obtuse beak. The pollinia are elliptical; the pedicel dilated upwards from a broad base, the disc is broad and oblong. The stigma has a tooth rising from the lower margin which nearly divides it in two.

R. alba, *Ridl.* *Arachnanthe alba*, Ridl. in Trans. Linn. Soc., Ser. II. (*Bot.*) iii. (1893) p. 369.
Hab. Singapore: Pulau Selitar! Also on the islands south-east of Singapore.
Pahang: Pekan!
Also Borneo!

This occurs in great abundance in open country usually near the sea. On Pulau Selitar (a very small island in the Johore Strait) it clambers over the thickets, sending down a dense curtain of roots.

RENANTHERA ANGUSTIFOLIA, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 49, *Ic. Pl.*, t. 2128.

Hab. Perak: Gunong Batu Putih, *Wray!*

R. ELONGATA, *Lindl.*, *Gen. et Sp. Orch.*, p. 218.
R. micrantha, Blume, Mus. Bot., i. 60.
Hab. Singapore: Rocks on the sea coast on Pulau Ubin!
Johore: Kwala Batu Pahat, *Kelsall!*
Perak: Dindings, near Lumut!
Penang: Government Hill, *Curtis!*

This usually grows straggling over rocks by the sea, and produces abundantly its horizontal panicles of innumerable cinnabar red flowers. It flowers every two or three months, and lasts long in bloom.

The natives call it "*Poko Api-Api Sesudu.*" "*Api-Api*" signifies a parasite, especially a *Loranthus*. *Suduk* (*Sesuduk* is *Suduk-Suduk*) is a spoon or a kris, possibly referring to the shape of the lip. The whole flower is of a dark cinnabar red except the white calli, a white spot at the base of the mid-lobe and a yellow crest to the anther. The lip is pinched in at the upper part of the spur, so that the two lateral lobes meet, leaving only a narrow slit as an entrance. The spur is dilated at the apex and full of nectar, a very different arrangement to that of the other species, which have an open spur narrowest at the apex without any nectar. The pollinia are elliptic, the caudicle oblanceolate narrowed in the middle, and the gland ovate blunt and rather large. The rostellum projects a little from the clinandrium floor; it is thin, and shortly bifid. There is a raised lump in the middle of the clinandrium.

RENANTHERELLA, Ridl., genus nov.

Scandens. Caules graciles. Folia lineari-lanceolata, semiteretia, acuminata, pungentia. Racemi breves, graciles; rhachis flexuosa. Flores parvi, pauci, remoti. Sepala oblanceolata obtusa, lateralia obliqua. Petala sepalis angustiora, linearia. Labellum *Renantheræ;* lobi laterales oblongi

erecti; medius linearis recurvus basi a callis 2 quadratis ornatus; calcar breve conicum. Columna elongata, gracilis, arcuata; clinandrium convexum; stelidia brevia, rotundata. Anthera conica, margine retuso; pollinia 2 elliptica, spathulata; pedicellus latus, oblanceolatus; discus latus oblongo-quadratus. Capsula 1½ poll. longa, obconica.

RENANTHERELLA HISTRIONICA, *Ridl.* *Caules* 2 ped. longi. *Folia* 3 poll. longa, superne canaliculata, patentia, crassa, atro-viridia. *Racemi* 4 poll. longi; bracteæ breves, ovatæ, acutæ, amplexicaules. *Sepalum* posticum erectum, lateralia postico breviora latiora convexa obliqua sub labello posita. *Petala* obtusa, ut sepala flava rubro-maculata rubro-marginata. Labellum sepalis multo brevius, 3-lobum; lobi laterales flavi rubro-maculati, apice rotundati marginibus rectis, medius lateralibus brevior flavus callis pallidis. *Columna* virescens rubro-marginata. *Ovarium* elongatum, gracile. *Renanthera histrionica*, Reichb. f. in Gard. Chron. (1878) p. 74; Hook. f., Fl. Brit. Ind., vi. p. 49.

Hab. Singapore: Sirangoon, in a mangrove swamp!
Malacca: Mt. Ophir, on trees!

This curious plant was described by Reichenbach from a plant of unknown locality cultivated in Day's Garden, and referred to the genus *Renanthera*, with which indeed it has much in common. But beside the habit, utterly unlike that of an ordinary *Renanthera*, it has an elongate, graceful, arched column, quite peculiar in the *Sarcantheæ*. It is an epiphyte, scrambling on tree branches, to which it clings by its long, white, stout, cylindrical roots. The narrow, fleshy, half-terete leaves, sharply pointed, are of a dark, dull green. The slender racemes bear a few flowers, opening but two or three at a time, of an orange yellow, with Indian red blotches. It flowers several times in the year.

VANDA, R. Br.

V. HOOKERIANA, *Reichb. f. in Bonplandia*, iv. (1856) p. 324.
Hab. Johore: Batu Pahat, *Lake and Kelsall!*
Perak: Kinta!

A terrestrial plant growing among bushes in swamps. The flowers vary very much in colour and size. It is commonly cultivated in Singapore under the name of the Kinta Weed.

This species is peculiar among the true Vandas from the absence of a spur, a mere depression representing it. It might be better to exclude it from the genus. It has, however, been successfully crossed here with *V. teres*, Lindl., a spurred species producing a remarkably handsome offspring, *V.* × *Miss Joaquim.*

VANDA TERES, *Lindl. in Wall. Cat.*, n. 7324.

Hab. Siam: Tonka (*Native collector*)!

This locality is hardly within our borders; I record it as the most southern known for the species.

RHYNCHOSTYLIS, Blume.

R. RETUSA, *Blume, Bijdr.*, p. 286. t. 49.

Hab. Southern Siam: *C. Curtis!*

I have it on Mr. Boxall's authority (himself the introducer of the species) that *Saccolabium littorale,* Reichb. f. in Gard. Chron. (1881) II. p. 198, is the same plant as *Rhyncostylis retusa*, Blume.

R. GIGANTEA, *Ridl.* *Saccolabium giganteum,* Lindl., Gen. et Sp. Orch., p. 221.

Hab. Singapore: at Selitar, on a big Dipterocarpous tree!
Pulau Aor, an island off the east coast of Johore (native)!

This is commonly imported by natives from the more distant islands, Tambilan, &c. A single plant found with *Dendrobium Dalhousieanum,* Wall., in Singapore, is the only known record from the peninsula.

The white flowered form is as commonly introduced here as the pink-spotted one.

TRICHOGLOTTIS, Blume.

T. RETUSA, *Blume, Bijdr.*, p. 360. fig. 8.

Hab. Selangor: Kwala Lumpur, on limestone rocks, *Kelsall!*
Pahang: Kota Glanggi, caves!
Siam: Pulau Rendong (native dealers!).
Also occurs in Borneo! and Java.

This plant agrees with Blume's figure and description as far as they go. It is a tall, stout plant, about 3 feet in length, with thick, broad, blunt, emarginate leaves, the sheaths of which are reticulately ribbed when dry. The flowers are solitary, on slender pedicels, orange yellow with red spots, the lip white and pubescent. They are about an inch across.

The Bornean form usually has shorter leaves, and looks a very different plant, but I see no difference in the flowers.

TRICHOGLOTTIS SCAPHIGERA, *Ridl., sp. nova.* *Caulis* 2 ped. longus, gracilis. *Folia* 3 poll. longa, ½ poll. lata, lanceolata acuta, subpetiolata, coriacea; vaginæ ½ poll. longæ, longitudinaliter costatæ. *Flores* singuli, e basi internodorum orti. *Bracteæ* 3–4, ovatæ, parvæ; pedicelli ¼ poll. longi, graciles. *Sepala* ¼ poll. longa, oblanceolata obtusa, carnosa, minute pubescentia. *Petala* similia. *Labellum* petalis brevius, basi cymbiforme; lobi laterales breves, obtusi, basi a callo hispido elongato ornati; lobus medius 3-lobus, laciniæ laterales lineares obtusæ, mediâ longior; discus a callo maximo pubescente notatus. *Columna* brevis, crassa, labello adnata; stelidia erecta, elongata, hispida, antheram haud superantia; clinandrii margo in dorso hispidus. *Anthera* ovata, rostrata, pubescens; pollinia 2, elliptica, transversim sulcata; caudiculus late linearis; discus cum caudiculo subæquilongus, oblongus.

Hab. Penang: Government Hill, *Curtis* (n. 1964)!

This has the base of the lip formed into a boat, hispid within, and bearing a hispid callus in the middle. Two small earlike processes represent the lateral lobes. The mid-lobe has a very large pubescent lump in the centre, and two narrow, linear lobes, one on each side, shorter than the terminal one.

T. TETRACERAS, *Ridl., sp. nova.* *Caulis* ultrapedalis, ⅛ poll. crassus. *Folia* 3 poll. longa, ultra ½ poll. lata, lanceolata acuminata, coriacea (sicca 5-costata), valde inæqualiter biloba lobo longiore acuto; vaginæ 1 poll. longæ, costatæ. *Flores* ½ poll. lati, singuli, foliis (semper?) oppositi, carnosi; pedunculi brevissimi, pedicelli ¼ poll. longi. *Sepala* oblongo-obovata. *Petala* sepalis minora, ligulata, obtusa. *Labellum* horizontale; lobi laterales breves dentiformes; lobi 2 postici multo longiores; lobus medius lanceolato-ovatus subobtusus; carinæ 2, e lobis anticis ortæ, inter lobos posticos in callo pubescente terminatæ; calcar pendulum, acuminatum, obtusum; callus elongatus, carnosus, elongatus, in ore lineari - truncatus.

Columna brevis, crassa; stelidia brevia, dentiformia; rostellum breve, distincte bilobum; pollinia globosa; caudiculus linearis.

Hab. Lankawi: Goa Chirita, *Curtis*, n. 2817!

This species is allied to *T. quadricornuta*, Kurz, of the Nicobar Islands, but differs in the entire, not bifid terminal lobe of the lip and the two ridges running from the posterior horns, and meeting at the base of the epichil in the form of a pubescent callus.

ACAMPE, Lindl.

A. PENANGIANA, *Ridl.*, *sp. nova.* *Caulis* brevis, crassus. *Folia* 7 poll. longa, 1½ poll. lata, lorata, valde rigide coriacea, ecarinata, apice vix biloba. *Racemus* 2½ poll. longus; pedunculus crassus, teres; vaginæ annuliformes. *Bracteæ* ovatæ, obtusæ, cucullatæ. *Flores* mediocres, subcorymbosi, carnosi; ovarium cum pedicello ½ poll. longum, crasse cylindricum. *Sepala* ½ poll. longa, ¼ poll. lata, late oblongo-obovata, obtusa, flava in dorso dense sanguineo-maculata; pagina interior sanguinea transversim fasciata. *Petala* cum sepalis æquilonga concoloria, angustiora, spathulata, obtusa. *Labellum* petalis paullo longius, ecalcaratum; lobi laterales elongati curvi obtusi erecti crassi flavi rubro–3-striati, medius ovatus subacutus crassus canaliculatus; discus inter lobos laterales pubescens. *Columna* brevis, valde crassa, conica, flava, basi a 2 costis semicircularibus rosaceis ornata; clinandrium planum, in margine haud elevatum. *Anthera* late ovata, apice obtusa; rostrum parvum; pollinia seniglobosa; caudiculus linearis angustatus; discus ovalis; stelidia minuta, erecta, dentiformia. *Stigma* grande, latum; rostellum deflexum bifidum, lobis acutis dentiformibus.

Hab. Penang: Government Hill, *C. Curtis!*

This is allied to *Acampe longifolia*, Lindl., Fol. Orchid. Acampe, p. 1 (i.e., *Vanda multiflora*, Lindl., Collect. Bot., t. 38), a native of Tenasserim; but has no spur.

SACCOLABIUM, Blume.

S. (§ MICRANTHÆ) PERPUSILLUM, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 56, *et Ic. Pl.*, t. 2129 A.

Hab. Singapore: Mangrove swamps; Kranji! Sungei Buloh! Common on branches of trees.

This very curious little plant was figured and described from dried specimens, and, as the flowers are so minute and difficult of analysis when dry, additional remarks are requisite to explain their structure. The flowers are snow white, turning rather bright yellow before withering, and have the scent of cucumbers, so common in *Saccolabium*. They are, when alive, hardly as pubescent as shown in the 'Icones'; in fact, they are rather minutely papillose. The sepals have a very faint violet streak on the outside. The lip has been flattened out in the figure above quoted. During life the sides are raised and concave, forming the lateral lobes; the "fleshy subcordate appendage" is the median lobe (epichil). There are no calli to the lip, but the entrance to the spur, which is full of nectar, is partially closed by the long beak of the anther and the viscid disc of the pollinia and the rostellum. The column is bright green, and the anther yellow. The latter is rounded on the top, and in front ends in a long, broad beak abruptly upcurved. The pollinia are globose, on a linear pedicel, which stands at an obtuse angle, with an equally long linear disc which, indeed, is prolonged beyond the insertion posticously as well as anticously. When the pollinia are removed from the column, the pedicel bends gradually down till it lies flat in the same plane with the disc. The rostellar arms are very long and drawn out into fine points, and stand nearly erect, being bent up at an angle with the base. The clinandrium is fairly deep, and has two little dentiform stelidia, one on each side. From its structure I imagine this flower must be fertilized by some small species of moth.

SACCOLABIUM (§ MICRANTHÆ) MISERUM, *Ridl., sp. nova.* *Cauli* ultra-pedalis, 1 poll. crassus, rigidus. *Folia* 5 poll. longa, ¼ poll. lata, patentia vel recurva, coriacea, inæqualiter biloba; vaginæ ¾ poll. longæ, ore obliquæ. *Racemi* brevissimi, 3–4-flori, e basibus vaginarum protrusi. *Flores* minimi, flavescentes. *Sepala* elliptico-ovata, vel ovata, lateralia paullo majora. *Petala* sepalis minora, lanceolato-oblonga. *Labelli* lobi laterales parvi, oblongo-quadrati truncati erecti oblongi, medius ovalis obtusus porrectus basi a callo minuto ornatus; calcar breve, incurvum conicum, obtusum. *Columna* brevis, crassa; stelidia brevia, ovalia, obtusa. *Anthera* depressa.

Hab. Penang: Government Hill, *C. Curtis*, (n. 2184)!
Lankawi Islands: *C. Curtis!*

A straggling, stiff plant with very short racemes of small and inconspicuous flowers of a yellow colour, with a pinkish tint at the mouth of the spur.

SACCOLABIUM TENUICAULE, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 64.
Hab. Penang: Government Hill, West Hill, *Curtis!*
Perak: *Scortechini.*

S. (§ MICRANTHÆ) LUISIFOLIUM, *Ridl.*, *sp. nova.* *Caulis* 1½ ped. longus; radices elongatæ, crassæ, teretes, griseæ. *Folia* 12 poll. longa, ferme ⅛ poll. crassa, plurima, subteretia, canaliculata, atroviridia. *Racemus* 6 poll. longus, gracilis, ramis 2. *Bracteæ* remotæ, minutæ, ovatæ, acutæ. *Flores* plures, parvi; pedicelli ⅛ poll. longi, rubri. *Sepala* oblongo-ovata, obtusa, rosea obscure maculata. *Petala* sepalis minora, oblongo-obtusa, rosea obscure maculata. *Labellum* cum sepalis subæquilongum, albo-hyalinum; lobi laterales majusculi rotundati, medius cymbiformis acutus in utroque latere a laciniâ parvâ lineari auctus. *Calcar* sigmoideum, obtusum, cum pedicello æquilongum. *Columna* alta, alba. *Anthera* ovata; rostrum longum; pollinia parva, globosa, canaliculata; caudiculus longus, tenuis, apice spathulatus; discus rotundatus, minutus; rostellum longum, basi latum, apice gracillimum. *Stigma* longum, latum, profundum.

Hab. Siam: Pungah, *C. Curtis!*

A slender plant with something of the habit of a *Luisia* and very small flowers in few-branched slender panicles. The rostellum, which is very long, appears to arise very far down the column. The leaves are nearly terete.

S. (§ MICRANTHÆ) FLAVEOLUM, *Ridl.*, *sp. nova.* *Caulis* 1 ped. longus, vix ⅛ poll. crassus; radices longæ, teretes. *Folia* 3 poll. longa, ⅛ poll. lata, coriacea; vaginæ ¾ poll. longæ. *Racemi* 2–3 poll. longi, basi nudi teretes; rhachis incrassata, sursum flexa. *Bracteæ* parvæ, ovatæ, acutæ, persistentes. *Flores* plures, singulatim expansi; pedicelli ¼ poll. longi. *Sepala* oblonga, obtusa, flavescentia in dorso rubro-carinata. *Petala* minima, oblonga, acuta, obliqua. *Labelli* lobi laterales lati quadrato-rotundati, medius brevissimus triangularis; callus linguiformis; calcar ⅜ poll. longum, calceiforme, obtusum. *Columna* crassa, brevis, subquadrangularis; clinandrium profundum. *Rostellum* longum, sursum curvum, integrum, canaliculatum. *Anthera* tenuis, ovata, rostrata; pollinia 2, globosa; caudiculus tenuis, linearis.

Hab. Kedah Peak: (*Native collector*), *C. Curtis*, Aug., 1893.

Flowers waxy, dull yellowish, small. This was brought down from Kedah Peak by a native collector to Mr. Curtis, who flowered it at Penang. It is a very inconspicuous plant, allied to *S. penangianum*, Hook. f.

SACCOLABIUM (§ MICRANTHÆ) FISSUM, *Ridl.*, *sp. nova.* *Caules* crassi; radices longæ, rigidæ, albæ. *Folia* 4 poll. longa, ½ poll. lata, lorata, crasse coriacea, carinata, canaliculata, atroviridia purpureo-maculata, apice profunde biloba acuta. *Racemus* 3 poll. longus, basi (vaginis paucis exceptis) nudus; rhachis brevis, crassa, teres. *Flores* ¼ poll. lati, plures, dissiti, carnosuli; pedicelli cum ovariis ¼ poll. longi, rosei. *Bracteæ* cum ovarii triente æquilongæ, ovatæ, bruneæ. *Sepala* ovata, subacuta, alba. *Petala* sepalis breviora, linearia, alba. *Labellum* album; lobi laterales breves erecti obtusi, medius oblongo-ovatus obtusus; macula in utroque lobo laterali violacea; lobi medii discus violaceus, basi a callo hemisphærico albo auctus. *Calcar* breve, obtusum, pendulum, crassiusculum, cum ½ parte ovarii æquilongum. *Columna* brevissima, crassa; stelidia obscura, rotundata, incurva. *Anthera* ovata, rostrata, flava, in lineâ medianâ violacea; pollinia ovata oblonga, aurantiaca; caudiculus spathulatus, apice late triangularis, ad discum ovatum majusculum junctus.

Hab. Lankawi Islands: *C. Curtis!*

This belongs to the set with broad, rather stiff leaves, and spur much shorter than the ovary.

S. (§ MICRANTHÆ) CORNIGERUM, *Ridl.*, *sp. nova.* *Caulis* elongatus, flexuosus; internodi ⅜ poll. longi; radices elongatæ. *Folia* 3½ poll. longa, ½ poll. lata, lanceolata acuta, apice inæqualiter biloba; vaginæ costatæ, ore obliquæ. *Racemus* brevissimus, 1–2-florus, internodi basin versus extrusus. *Bracteæ* brevissimæ. ovatæ obtusæ. *Flores* mediocres; ovaria cum pedicellis ½ poll. longa. *Sepala* ⅜ poll. longa, oblonga, spathulata subobtusa; bruneo-flava. *Petala* sepalis latiora, bruneo-flava. *Labellum* petalis paullo brevius, flavescenti-album; lobi laterales cornuti erecti, medius oblongo-spathulatus obtusus. *Calcar* ¼ poll. longum, conicum, obtusum, rectum. *Columna* brevis, crassa; stelidia lata, rotundata. *Anthera* elongata, conica.

Hab. Penang: West Hill, *C. Curtis*, March, 1892!

A straggling plant with inconspicuous flowers. It is allied to *S. penangianum*, Hook. f., but has a very different lip, with a larger mid-lobe, and horn-like lateral lobes.

SACCOLABIUM PENANGIANUM, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 57, *et Ic. Pl.*, t. 2129 B.

Hab. Perak: Sungkei River, *Curtis!*

This plant is unfortunately named, as the locality whence it was obtained is in Perak, and not in Penang.

S. MINIMIFLORUM, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 59, *et Ic. Pl.*, t. 2133.

Hab. Perak: *Scortechini.*

I only know this from Scortechini's drawings, and take it to be a *Sarcochilus.*

S. (§ SPECIOSÆ) MINIATUM, *Lindl.*, *Bot. Reg.* (1847), *sub* t. 26, t. 58.

Hab. Lankawi Islands: *C. Curtis!*

S. (§ SPECIOSÆ) SAXICOLUM, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 374.

Hab. Pahang: Kota Glanggi!

§ *Calceolares.*

This section is one of the most distinct in the genus, and might almost be generically separated. Its great peculiarity is that the lateral lobes of the lip meet and are connate in front, so as to form a wall between the mouth of the spur and the epichil, instead of having free apices.

The basin-shaped spur is also peculiar in the genus.

S. CALCEOLARE, *Lindl. in Wall. Cat.*, n. 7302.

Hab. Perak: Gunong Hijan, summit of the Larut Hills, abundant on trees, low down!
Pahang: Kota Glanggi, on rocks!

This form has very long narrow falcate leaves, attaining a length of 6 inches. The flowers are barely half an inch across.

S. BIGIBBUM, *Reichb. f.*, *ex Hook. f.*, *Bot. Mag.*, t. 5767.

Hab. Perak: *Scortechini.*

Scortechini's drawing, labelled *S. bigibbum*, seems to be different from that in 'Bot. Mag.,' t. 5767. I have not seen anything else of this species.

MICROSACCUS, Blume.

Microsaccus, *Blume, Bijdr.*, p. 367, is a monotypic genus, which should probably be reduced to *Saccolabium*, from which it chiefly differs in habit. It has somehow got confused with the very distinct genus *Adenoncos*, which is a spurless plant allied to *Luisia.*

M. javensis, *Blume, l.c.*, is a tufted plant, with curved stems 4 inches to 6 inches long, covered with dark green leaves, which are equitant and scalpelliform. The flowers are one or two in number, white, except for a yellow spot at the base of the lip, with rather large white bracts. The pollinia are four in number, equal, globose, on a slender narrow pedicel which bears a small lanceolate disc. The rostellum is rather long, tooth-shaped, and entire. The stigma transversely oblong.

It is common in mangrove swamps and on rocks.

Hab. Singapore : Kranji ! &c.
Selangor : Bukit Hitam, *Kelsall !*
Perak : *Scortechini.*
Also in Tenasserim, Cambodia, and Java !

TÆNIOPHYLLUM, Blume.

T. Serrula, *Hook. f., Fl. Brit. Ind.*, vi. p. 77. *Radices* longæ, copiosæ, læte virides. *Caulis* brevissimus. *Racemi* ½–1 poll. longi, plures, ferme omnino floriferi. *Bracteæ* distichæ, acutæ, minute pubescentes vel quasi-muricatæ. *Flores* minimi, singulatim expansi, ochrei. *Sepala* anguste lanceolata, obtusa. *Petala* sepalis angustiora. *Labellum* cymbiforme (explanatum), obovatum, ferme integrum, album ; lobi laterales obtusi, rotundati. *Calcar* breve, scrotiforme, olivaceum. *Columna* brevis, crassa ; clinandrii margines vix elevati. *Anthera* magna, compressa, alba purpureo-2-maculata ; rostrum latum truncatum ; pollinia 4, globosa, æqualia ; caudiculus anguste linearis ; stelidia late obtusa, incurva ; rostellum rostriforme, obtusum, integrum. *Capsula* 1 poll. longa, elongata sarciniæformis, apice attenuata, segmentis indistinctis.

Hab. Singapore: common on *Podocarpi* and other trees near mangrove swamps, also on orchard trees; Kranji, Sungei Buloh! Chan Chu Kang! Toas! Serangoon, &c.
Malacca: Sungei Rambei!
Johore: Kota Tinggi!
Pahang: Pekan! Cherating River! Pulau Chengei!
Penang: Western Road, *Curtis!*
Selangor: Kwala Lumpur!
Perak: Larut (fide Hooker).

Tæniophylla are so difficult to describe from dried specimens that I make no apology for re-describing this from living plants. It is not easy to compare it with any other of the small genus, as most of the species are but indifferently described. I have never seen any leaves on the plant.

TÆNIOPHYLLUM RUBRUM, *Ridl.*, *sp. nova.* *Radices* paucæ, graciles, teretes, virescentes. *Caulis* vix ullus. *Racemus* 1 poll. longus, gracilis, ruber, basi nudus, in ½ parte superiore florifer. *Bracteæ* ovatæ, distichæ, minute pubescentes, rubræ. *Flores* minuti, rubri; ovaria brevia; pedicelli vix ulli. *Sepala* petala, labellum connata. *Sepala* lanceolata, acuta. *Petala* linearia. *Labellum* cum petalis æquilongum, triangulari-lanceolatum acutum, basi latum. *Calcar* ovario brevius, saccatum, latum, obtusum. *Columna* brevis.

Hab. Sungei Ujong: on a coffee tree on Linsum estate!

I have only seen one plant of this, which is very distinct in its very short stem, slender elongate scape, and connate perianth of a red colour.

CLEISOSTOMA, Blume.

This genus is usually distinguished from *Saccolabium* by the presence of a callus within the spur, and from *Sarcanthus* by the absence of the septum, which in that genus divides the spur more or less in two. It has several times been proposed to merge both genera into *Saccolabium*, especially as the calli are often difficult to make out in dried specimens. I should be inclined to retain both genera, although they are certainly very closely allied to *Saccolabium*. The septum in *Sarcanthus* is evidently the well-developed longitudinal central ridge of which traces can be seen in most of the genera of *Sarcantheæ* and in many other groups. The bifid lamella of the back of the spur in *Cleisostoma* seems to correspond to the hypochilary callus of many orchids. From its being often glandular pubescent on the lower face I imagine that its function is to secrete nectar. Both of these organs differ considerably in size, extent of development, and form, so that it is difficult to use them as means of separation of the genera. But there is another distinguishing mark which is much easier to utilize. In *Sarcanthus* the lateral lobes of the lip are usually short, and do not meet in the middle line; the terminal lobe is often small, and it is generally more or less channelled; so that a depression leads from it into the horizontal spur. In *Cleisostoma* we have the short wall like lateral lobes meeting or nearly meeting in the middle lobe; while the mid-lobe is oval or reniform, and barred off from the pendent spur by the lateral lobes. The structure of the *Cleisostoma* lip is that of the *Calceolaria* section of *Saccolabium*, except that the spur is usually longer and contains the lamellary callus. With these characters there is also a difference in colouring, which though not of any great generic importance, yet is worth noting. In *Sarcanthus* the prevailing colouring is sepals and petals green with a more or less distinct longitudinal central red bar, and lip violet or pale rose; whereas in *Cleisostoma* the ground colour of the whole flower is yellow, and it is irregularly marked with dark red spots.

Of the Indian Cleisostomas, *Cleisostoma andamanicum*, Hook. f., *C. Mannii*, Reichb. f., *C. bicuspidatum*, Hook. f., *C. spicatum*, Lindl., *C. latifolium*, Lindl., *C. parvum*, Ridl., *C. maculosum*, Lindl., *C. crassum*, Ridl., *C. uteriferum*, Hook. f., and probably most of the others in the 'Flora of British India,' possess nearly all these characters, and form a group which can be easily distinguished from *Sarcanthus* and *Saccolabium*. I imagine *Saccolabium Helferi*, Hook. f., Ic. Pl., t. 2130, will prove to be a *Cleisostoma*; it has the form and habit as well as the shape of the lip of *Cleisostoma*, though the callus appears to be sometimes wanting.

CLEISOSTOMA LATIFOLIUM, *Lindl.*, *Bot. Reg.* (1840) *Misc.*, p. 60.

Hab. Singapore: (fide Lindley, l.c.).
Malacca: *Griffith.*
Perak: *Wray.*
Pahang: Temerloh!
Also Sumatra, at Djambi!

A very tall stout plant, scrambling over trees, bearing large spreading panicles of small flowers.

CLEISOSTOMA SPICATUM, *Lindl.*, *Bot. Reg.* (1847), *sub* t. 32.
Hab. Singapore: Jurong!
Johore: Tana Runto!
Penang: common on orchard trees, in the town and at Tanjong Bunga!

It also occurs in Tenasserim, and is apparently abundant at Sarawak, in Borneo.

C. UTERIFERUM, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 74.
Hab. Perak: *Kunstler.*

C. PARVUM, *Ridl.*, *sp. nova.* *Caulis* vix 1 poll. longus; radices longæ, tenues, griseæ. *Folia* 1½ poll. longa, ⅛ poll. lata, lanceolata falcata acuta, tenuia, apice inæqualiter biloba. *Racemus* ¼ poll. longus, pauciflorus. *Bracteæ* ovatæ, parvæ, remotæ. *Flores* ⅛ poll. lati, carnosi. *Sepalum* posticum lanceolato-oblongum obtusum, lateralia magis ovata. *Petala* cum sepalo postico æquilonga, lorata, oblonga. *Labelli* lobi laterales quadrati, medius late ovatus; calcar saccatum oblongum, crassum; callus loratus bifidus. *Columna* brevis, crassa; clinandrium in medio elevatum. *Anthera* ovata, magna, tenuis; rostellum elongatum, lineare, decurvum.

Hab. Pahang: Kota Glanggi, on limestone rocks; only one specimen obtained. v.s.

A very small species with a remarkably short stem and rather thin textured leaves.

C. IONOSMA, *Ridl.*, *sp. nova.* *Caulis* 6 poll. longus; radices copiosæ. *Folia* 6 poll. longa, ¾ poll. lata, lorata, coriacea, atroviridia, apice inæquiloba lobis rotundatis. *Paniculæ* plures, 8 poll. longæ, laxæ, multi-ramosæ. *Flores* plurimi, remoti; bracteæ minutæ, ovatæ, acutæ; pedicelli ¼ poll. longi. *Sepala* $\frac{3}{16}$ poll. longa, oblonga, obtusa. *Petala* sepalis minora; sepala petala extra fusca, intus olivacea, a lineis plurimis transversis violaceis notata. *Labellum* sepalis brevius; lobi laterales triangulares obtusi violacei, medius ovatus apice 2-callosus; calcar ⅜ poll. longum, rectum, obtusum, roseo-album, in ore a callo linguiformi albo ornatum. *Columna* brevis, violacea; stelidia brevia, rotundata, involuta; clinandrium haud profundum. *Anthera* subplana, flava; margo anticus elevatus, bifidus;

pollinia 4 (*i.e.* 2 biloba) ovoidea, tenuia, pallida; caudiculus linearis; discus parvus, ovatus. *Rostellum* elevatum, apice deflexum lobis obtusis bifidum. *Stigma* latum.

Hab. Perak: Thaiping Hills (June, 1893!).

Remarkably sweetly scented of violets. The callus in the throat of the spur is a thick decurved tongue, which only partly blocks the entrance.

SARCANTHUS, Lindl.

S. HALOPHILUS, *Ridl.*, *sp. nova.* Cæspitosa. *Caules* 3–12 poll. longi, graciles, teretes, curvi; radices copiosæ. *Folia* 3 poll. longa, vix $\frac{1}{8}$ poll. crassa, teretia, pungentia, curva; vaginæ $\frac{1}{4}$ poll. longæ, rugosæ. *Racemi* usque ad 6 poll. longi, plures, graciles, pluriflori. *Bracteæ* minimæ, ovatæ, persistentes. *Pedicelli* cum ovariis $\frac{1}{4}$ poll. longi, patentes. *Flores* expansi $\frac{1}{4}$ poll. lati. *Sepala* oblonga, obtusa. *Petala* sepalis minora, oblongo-obovata obtusa; sepala petala pallide olivacea rubrotincta. *Labellum* roseum; lobi laterales breviusculi ovati erecti obtusi apice roseo-violacei, medius multo longior hastatus obtusus; callus dorsalis obtriangularis, incurvus, crassus, albus; calcar pedicello multo brevius, horizontale, rectum, haud septatum. *Columna* recta, subcylindrica; clinandrium planum, subrotundum, virescens. *Anthera* obovata, obtusa, rostrata, flava; pollinia parva, globosa; caudiculus linearis; discus latus hastatus, truncatus; stelidia quadrata, parallela, approximata. *Stigma* profundum, obovatum. *Capsula* $\frac{3}{8}$ poll. longa, oblonga.

Hab. Singapore: Kranji! Sungei Morai! Sungei Tengeh! Pulau Tekong!
Johore: Batu Pahat! Tana Runto!
Also in the Carimon Isles! Rhio! and Pulau Buru! south of Singapore.

Common on trees near the sea.

I can find no description to suit this little plant, so abundant along our sea-coasts. The colouring and form of the lip resemble those of *S. secundus*, Griff., but there is no real septum in the short horizontal spur, though a channelled ridge runs down it. The dorsal callus is large and thick. The pedicel of the pollinia, which are sessile, passes into a broad triangular thin disc, with the two angles prolonged in the form of teeth.

SARCANTHUS SACCULATUS, *Ridl., sp. nova.* *Caulis* 8 poll. longus, $\frac{1}{10}$ poll. crassus. *Folia* 6 poll. longa, $\frac{1}{10}$ poll. crassa, teretia, obtusa; vaginæ 1 poll. longæ, costatæ, transversim reticulatæ. *Racemi* 3 poll. longi, graciles. *Flores* usque ad 20, parvi dissiti. *Bracteæ* minutæ, ovatæ; pedicelli $\frac{1}{8}$ poll. longi, patentes. *Sepala* ovata, subacuta. *Petala* sepalis minora, lorata. *Labelli* unguis brevis; lobi laterales majusculi ovati erecti, medius elongatus lineari-lanceolatus hastatus marginibus involutis crassus; calcar majusculum, saccatum, obtusum, superne contractum, haud septatum; carina in lobo medio paullo elevata; callus dorsalis clavatus, sub-bilobus. *Columna* elongata, semiteres. *Anthera* ovata, tenuis, haud rostrata.

Hab. Lankawi Islands: *Curtis*, v.s. (n. 2560).

A slender plant, with the habit of *S. filiformis*, Lindl., but with very different flowers. The lip has a narrow terminal lobe with the edges involute; the median keel ends at the entrance of the spur. The spur is rather large and saccate, but pinched in at the upper part like a conventional money-bag. The dorsal callus is large and clubbed, paw-shaped and bilobed, glandular on the lower surface.

S. SECUNDUS, *Griff.*, *Notul.*, iii. 362, *et Ic. Pl. As.*, t. 336.

Hab. Johore: Batu Pahat!
Malacca: Sungei Rambei! Kesang!
Sungei Ujong!
Perak: The Cottage, Larut Hills, *Hervey!*
Rhio: (*Native collector*)! Saigon!

This is often brought in by orchid dealers from the islands near Singapore. The leaves are dark green and very thick, but flattened and lorate till an inch from the end, where they suddenly become terete and pungent. This, which is well shown in Griffith's drawing and is probably the origin of Wallich's MSS. name *oxyphyllus*, is overlooked in the description in the 'Flora of British India.'

It is called "*Sakat Ular*," *i.e.*, Snake orchid, in Sungei Ujong.

S. SCORTECHINII, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 68.

Hab. Pahang: River Tahan! Kota Glanggi!
Perak: *Scortechini.*
Penang: near the coast, *Curtis*, 2130!

SARCANTHUS PENSILIS, *Ridl.*, *sp. nova.* *Caulis* usque ad 3 poll. longus, crassus. *Folia* pauca, 6 poll. longa, 1 poll. lata, lorata, apice obtuse biloba, atroviridia, polita. *Racemus* foliis longior, gracilis, pendulus, in ½ parte inferiore nudus; rhachis purpurea. *Flores* ½ pol. lati, remoti. *Bracteæ* parvæ ovatæ; pedicelli ½ poll. longi, purpurei. *Sepala* oblongo-ovata, obtusa. *Petala* sepalis minora, oblanceolata, obtusa, virescentia rubrotincta. *Labellum* roseum; lobi laterales majusculi cornuti erecti, medius brevis ovatus obtusus; callus dorsalis elongatus, crassus, obtusus; septum completum, superne sub callo dorsali incrassatum. *Columna* brevis, crassa, flexa. *Anthera* ovata, rostrata; pollinia ovoidea, ferme bipartita, in pedicello ad caudiculum linearem longius adnato sita; discus parvus, ovoideus.

Hab. Johore: Batu Pahat!

Near *S. Parishii*, Hook. f.; but the flowers are differently coloured, the lateral lobes of the lip much longer, and the septum of the spur much longer, completely separating the spur into two halves except at the top and bottom, with a thickened portion where it rises from the mid-lobe on which the dorsal callus rests. The pedicels of the flowers are much longer, and the flowers more distant. The pollinia much resemble those of *S. Parishii.*

S. CASTANEUS, *Ridl.*, *sp. nova.* *Caulis* 1 ped. longus, crassus, paullo compressus. *Folia* 6 poll. longa, 3 poll. lata, obtusa, coriacea, apice valde inæqualia; vaginæ 1 poll. longæ, ore obliquæ. *Panicula* usque ad 8 poll. longa, biramosa, pendula, in majore parte a floribus dense tecta; rhachis pubescens, caliginosa. *Flores* ½ poll. lati, carnosi. *Bracteæ* ½ poll. longæ. lanceolatæ, acuminatæ, reflexæ; pedicelli cum ovariis crassis ¼ poll. longi. *Sepala* ovato-lanceolata obtusa, flavescentia dense castaneo-maculata. *Petala* sepalis minora, lanceolata. *Labellum* flavum rufo-tinctum, basi columnæ adnatum; lobi laterales oblongi obtusi lobulo antico minore, medius lanceolatus subobtusus carnosus; calcar ¼ poll. longum, pendulum, latum, clavatum; septum breve, calcaris dorso haud adnatum; callus anticus tenuis, furcatus. *Columna* crassa; clinandrium in medio elevatum; stelidia crassa, obtusa, parallela. *Anthera* quadrato, rostrata; rostrum obtusum uniloculare; pollinia 2, globosa, postice sub-biloba; caudiculus e basi latiore acu-

minatus; discus minutissimus. *Stigma* grande, ellipticum, marginatum.

Hab. Singapore: on a tree in Dalvey Road, very rare!

It has also been brought in by dealers from some of the other islands.

This pretty species was first found on a roadside tree in Singapore by a native. It is a stout broad-leaved plant, with a dense hanging panicle (only one-branched) or a simple raceme of chestnut-coloured flowers with a yellow lip.

The lip in section shows a short ridge on the epichilary portion which meets, but is not adnate to, the back of the spur; above it on the back of the spur is a very slender forked process. This is so delicate that it is very easily overlooked, even in a living specimen.

The clinandrium is elevated in the centre, the pedicel of the pollinia overlying this. The disc of the pollinia is so minute as to be almost invisible.

SARCANTHUS BRACTEATUS, *Ridl.*, *sp. nova.* *Caules* 1 ped. longi, $\frac{1}{2}$ poll. crassi, complanati, a vaginis costatis tecti. *Folia* 6 poll. longa, 1 poll. lata, lorata, coriacea, apice lobis rotundatis inæqualiter bifida. *Paniculæ* 6 poll. longæ, axillares, apice nutantes, basi (paucis vaginis exceptis) nudæ, pauci-ramosæ, pubescentes. *Flores* plures, congesti, parvi. *Bracteæ* magnæ, ovatæ, acutæ, flores superantes, flavo-virentes in lineâ medianâ rubræ. *Ovarium* breve, crassum, albo-lanuginosum. *Sepala* $\frac{1}{8}$ poll. longa, cymbiformia lanceolata, carinata, pubescentia, crassa, atrosanguinea in margine tenuiora viridia. *Petala* sepalis breviora, elliptica, obtusa, tenuia, in margine minute lacerato viridia, in medio bruneo-maculata. *Labellum* sepalis brevius, horizontale, carnosum; lobi laterales porrecti lanceolato-triangulares acuti virescentes, medius cordatus cymbiformis apice suberecto-2-cornuto albus margine cornubusque roseo-violaceus; callus magnus e medio disci ortus, basi elevatus incrassatus, flavescens violaceo-punctatus, in lateribus pubescens; calcar horizontale, breve, crassum, apice rotundatum, flavescens. *Columna* brevis, crassa, alba, basi lata. *Anthera* parva, ovata, obtuse rostrata; loculi haud disjuncti; pollinia 2, ovoidea; caudiculus basi angustus, superne dilatatus et in $\frac{1}{2}$ parte longitudinis fissus, tenuis; discus parvus, lanceolatus. *Clinandrium* parvum; margo anticus incrassatus,

elevatus. *Rostellum* lobis lanceolatis decurvis bifidum. *Stigma* ovoideum, profundum, viride; columnæ margines valde incrassati. *Capsula* $\frac{1}{2}$ poll. longa; costæ steriles lineares, fertiles multo latiores.

Hab. Southern Siam: Ghirbee, *C. Curtis;* (fl. Hort. Bot. Penang, June, 1893).

A single plant of this remarkable species alone was found. The most striking feature of it at first sight is the large size of the bracts, which almost conceal the flowers. The sepals, which are deep purple with a narrow green margin, are thickened on the back into a keel, which is eventually prolonged beyond the rest of the sepal. The lip is boat-shaped, with two pink horns diverging at the point. The callus does not penetrate into the spur, but partially blocks the mouth.

The column is very curious; the base below the stigma is very short and broad; the stigma itself is small, but the sides of the column are produced forwards and much thickened, so that the entrance to the stigma is really large. The clinandrium slopes backwards, and is thickened in front above the rostellum into a kind of boss over which the pedicel of the pollinia lies. Thus the front of the clinandriun is absolutely closed. This raised portion may be either a continuation of the lateral margins of the clinandrium connate in the middle line, or may be the stelidia raised above the stigma and connate at their apices.

PELATANTHERIA, Ridl., genus nov.

Caules longi, erecti, radicantes. Folia oblonga, obtusa, coriacea, apice biloba. Flores mediocres vel parvi, in racemis brevibus lateralibus pauci. Sepala lanceolata vel ovato-lanceolata; petala subsimilia. Labellum calcaratum; lobi laterales columnæ adnati; epichilium majusculum planum; callus basalis in calcaris fauce situs; callus epichiliaris dentiformis. Columna brevis, lata; stelidia elongata, erecta. Anthera magna, ovata, plana, bilocularis; pollinia 2; caudiculus brevis, latus, subquadratus angulis sursum curvis; discus subæquilongus, magnus, reniformis vel subquadratus.

This genus is allied to *Sarcanthus*, though totally different in habit. The stems are usually tall, and the racemes short.

The column is remarkably broad and thick. The pollinia are very distinct in the broad short quadrate caudicle and equally large disc.

PELATANTHERIA CTENOGLOSSUM, *Ridl., sp. nova.* *Caules* 8–10 poll. longi, compressi, erecti, rigidi. *Folia* 1 poll. longa, $\frac{1}{3}$ poll. lata, plura, lanceolata, crassa, carnosa, carinata, apice inæqualiter biloba; vaginæ in altero latere profunde fissæ, in sicco rugosæ. *Racemi* $\frac{1}{4}$ poll. longi, crassi, 2-flori. *Bracteæ* ovatæ, pedicellis arcte appressæ; pedicelli cum ovariis $\frac{1}{2}$ poll. longis, crassi. *Flores* ferme $\frac{1}{2}$ poll. lati, carnosi. *Sepala* ovata, obtusa, paullo cucullata, flava rubro-striata, lateralia magis oblonga. *Petala* lanceolato-ovata, obtusa, sepalis pallidiora. *Labellum* columnæ adnatum; lobi laterales rotundati albescentes, medius semiovatus scutiformis acuminatus carnosus flavus in medio elevatus in utroque latere fimbriato-acuminatus; calcar cum $\frac{3}{4}$ parte pedicelli æquilongum, crassum, paullisper uncatum, obtusum, virescens rubro-striolatum; callus glandulosus, in lineâ medianâ fasciatus elevatus, in utroque latere lanuginosus, in calcaris fauce situs; processus linearis, dentiformis, horizontalis in lobo medio additur. *Columna* brevis, lata; clinandrium haud profundum; stelidia erecta, curva, cornuta. *Anthera* magna, plana, bilocularis; pollinia 2, semiglobosa, postice fissa; caudiculus latus, quadratus, truncatus lateribus cornutis sursum curvis; discus magnus, semicircularis, subtus excavatus. *Rostellum* lobis crassis prosilientibus decurvis bifidum. *Stigma* a lateribus columnæ incrassatis tectum.

Hab. Saigon: *Haffner!* v.v.

A very singular plant with an erect stiff stem emitting roots at intervals. Leaves short and fleshy, channelled above and strongly keeled, the keel running downwards into stem, red edged with a few red spots. The lip has the lateral lobes adnate to the sides of the column. Between them, at the entrance to the spur, is a curious glandular body with a linear median bar, and a woolly mass on each side. The epichil is semiovate, ending in a narrow point which bears a comb-like fringe on each side. The column is remarkably broad. The anther cells are widely separated by a broad connective. The pedicel is square broad and truncate, the sides curved up in the form of two horns, the disc large hemispheric and excavate below.

Pelatantheria cristata, *Ridl.* *Cleisostoma cristatum*, Ridl. in Trans. Linn. Soc., Ser. II. (Bot.) iii. (1893) p. 370.

Hab. Pahang: Tahan and Pahang rivers!

I have obtained additional specimens of this species from the Tahan River through a native collector. They are very much larger than the plant originally described, being 8 inches long, and possess longer deflexed racemes 4 inches in length, and bearing several flowers.

P. insectifera, *Ridl.* *Sarcanthus insectifer*, Reichb. f. in Bot Zeit., xv. (1857) p. 159; Hook. f., Fl. Brit. Ind., vi. p. 68, et Ic. Pl., t. 2137.

Hab. Bengal to Tenasserim.

Belongs apparently to this genus.

SARCOCHILUS, R. Br.

S. caligaris, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 372.

Phalænopsis fugax, Kraenzlin, in Gard. Chron. (1893) ii. p. 360.

Hab. Singapore: Bukit Timah; Chan Chu Kang!
Pahang: Kwala Pahang!

The plant described as *Phalænopsis fugax* by Kraenzlin, l.c., must be allied to this species, if indeed it is not the same. It is evidently no *Phalænopsis*.

S. tanyphyllus, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 372.

Hab. Pahang: Limestone rocks; Kota Glanggi!

S. stenoglottis, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 34.

S. brachyglottis, *Hook. f.*, *l.c.*

S. aureus, *Hook. f.*, *l.c.*, p. 35.

S. cladostachys, *Hook. f.*, *l.c.*

S. hirsutus, *Hook. f.*, *l.c.*, p. 38.

All obtained in Perak by the Calcutta Garden's collectors and Father Scortechini. I know nothing of them.

S. adnatus, *Ridl.*, *sp. nova.* *Caulis* elongatus, validus, subteres. *Folia* 6 poll. longa, 1 poll. lata, lorata, coriacea, canaliculata, carinata, apice obtuse inæqualiter biloba mucronato

interjecto. *Racemi* 3 poll. longi, laterales, ascendentes; pedunculus validulus, purpureus; vaginæ paucæ, dissitæ. *Flores* 12–16, 1 poll. longi, inversi, carnosi; pedicelli 1 poll. longi, suberecti, crassiusculi; bracteæ breves, ovatæ, pedicello arcte appressæ. *Sepalum* posticum elliptico-obovatum obtusum, lateralia latiora ad unguem labelli adnata apice obtusa, excurva, flava apice rubro-punctata. *Petala* $\frac{1}{4}$ poll. longa, $\frac{1}{8}$ poll. lata, lanceolata, explanata, flava. *Labellum* sepalis longius, carnosum; unguis rectus, canaliculatus; lobi laterales longi obtusi erecti, medius lateralibus brevior ovatus; calcar porrectum, curvum, latum, obtusum, a processu intus partim clausum, flavum apice bruneum. *Columna* longiuscula, erecta; pes brevis, distinctus. *Anthera* tenuis, ovata, obtusa; pollinia 2, globosa; pedicellus brevis, linearis, in caudiculo longiore tenuissimo insertus; discus minutus ovatus. *Rostellum* elongatum, subulatum, acutum.

Hab. Singapore: Toas district; one plant!
Johore: Kota Tinggi; one plant!

This is a very rare and curious plant, and in many respects so utterly different from typical *Sarcochili* that I am doubtful whether it should not be considered as the type of a new genus. It has a tall stout stem like that of a *Saccolabium*, a short stout erect raceme of firm-textured flowers which open one or two at a time, but without any long interval. The flowers are yellow and brown, inserted from the normal position of orchids so that the spur points upwards. The lateral sepals are adnate to the back of the lip, which latter has the regular shoe-shape of the genus. The pollinia have the double pedicel of several of the *Sarcantheæ*—a short pedicel attached to a longer one at right angles to it (in the first position). I have only twice met with it: once on a tree in Western Singapore, and once I gathered it on the banks of a tidal river in Southern Johore.

ASCOCHILUS, Ridl., genus nov.

Caulis brevis, paucifoliatus. Folia falcata, acuta, subcoriacea. Pedunculi singuli, plures, gracillimi, muricati. Flores parvi, tenues, in racemo brevi siti. Bracteæ parvæ, ovatæ. Sepala inæqualia, lateralia postico multo latiora, sæpe obliqua, ad pedem columnæ adnata. Petala sepalo postico similia.

Labellum 3–4-lobum; lobi laterales majusculi, medius integer vel bilobus; calcar pendulum; calli 0. Columna elongata; pes longus, porrectus, cum columnâ æquilongus vel paullo brevior. Clinandrii margo posticus elevatus. Rostellum elongatum, acutum. Capsula elongata, cylindrica.

Species 2. A. HIRTULUS, *Ridl.* *Sarcochilus hirtulus*, Hook. f.
A. SIAMENSIS, *sp. nov.*

This genus has the habit of some of the *Sarcochili;* but it is distinct from any of the allied genera in the long column, with a long foot at right angles to the body of the column, on the end of which is borne a lip with two large erect lateral lobes, and an entire or bilobed terminal lobe. The inequality of the size and form of the sepals is unusual in the whole group. The raceme develops rapidly as in *Saccolabium*, &c., and does not continue to grow after the flowers have begun to open, as in *Thrixspermum.*

A. HIRTULUS, *Ridl.* *Sarcochilus hirtulus*, Hook. f., Fl. Brit. Ind., vi. p. 89, *et Ic. Pl.*, t. 2121.

Hab. Pahang: Tahan River, Kota Glanggi, Limestone rocks!
Perak: *Scortechini.*
Malacca: *Maingay.*

The flowers are cream colour with pink spots, pretty though small. I found this little plant very abundant on the limestone rocks at Kota Glanggi.

I have no doubt as to the correctness of my identification with the species described and figured by Sir Joseph Hooker; but I find the following differences:—The lateral sepals are much broader than the posticous one and distinctly keeled, and are adnate to the very long column foot. The petals are more linear. The foot of the column is remarkably long and slender, and stands at right angles to the body of the column. On the extreme end is borne the lip, the terminal lobes of which are distinctly broader than the lateral ones.

A. SIAMENSIS, *Ridl.*, *sp. nova.* *Caulis* 1 poll. longus; radices copiosæ, tenues. *Folia* 5 poll. longa, vix $\frac{1}{2}$ poll. lata, lorata, falcata, in sicco striata, apice inæqualiter biloba subacuta. *Racemi* 3 poll. longi, plures, graciles, muriculati, basi longe nudi. *Bracteæ* minutæ, ovatæ; pedicelli $\frac{1}{8}$ poll.

longi. *Flores* perparvi, 2–3 simul expansi. *Sepalum* posticum ellipticum, lanceolatum, lateralia multo latiora rhomboidea obliqua carinata acuta. *Petala* lineari - lanceolata, curva. *Labellum* longe unguiculatum, album; lobi laterales magni oblongi apice rotundati, medius linguæformis sursum curvus; calcar angustum, longe cylindricum obtusum. *Columna* longiuscula; stelidia in parte superiore sita, oblonga subtriangularia, obtusa. *Pollinia* globosa; caudiculus angustissimus, apice furcatus.

Hab. Siam: Bangtaphan, *Dr. Keith!* On the bole of a tree in jungle. v.s.

This has much the habit of *A. hirtulus*, Ridl., but differs in the very unequal sepals (a rare character in *Sarcantheæ*, the very long claw, entire epichil, broad lateral lobes, and very long, narrow spur.

AERIDES, Lour.

A. ODORATUM, *Lour.*, *Fl. Cochinch.*, p. 525.

A. suavissimum, Lindl. in Journ. Hort. Soc., iv. (1849) p. 264.

A. virens, Lindl., Bot. Reg. (1843) Misc., p. 41.

Hab. Johore: Pulau Tinggi, *Feilding!*
Selangor: Bukit Hitam, *Kelsall!*
Malacca: *Maingay!*
Lankawi: *Curtis!*
Kedah: Pulau Song Song! Yan!

This usually grows on rocks and trees overhanging the sea. It seems especially abundant in the small islands to the south of the peninsula. *A. suavissimum*, Lindl., is the best variety, with a longer raceme. It is commoner in the north of the peninsula.

A. MULTIFLORUM, *Roxb.*, *Pl. Corom.*, iii. p. 68, t. 271.

Hab. Siam: Bangtaphan, *Dr. Keith!* Tonka (native dealers!).

THRIXSPERMUM, Lour.

THRIXSPERMUM, *Lour.*, *Fl. Cochinch.*, p. 519.

Dendrocolla (§ *Cuculla*), Blume, Bijdr., p. 287.

Orsidice, Reichb. f. in Bonplandia, ii. (1854) p. 93.

Plantæ terrestres vel rupestres. Caules sæpe elongati, undique radicantes. Folia amplexicaulia, ovata aut oblonga, lorata. Pedunculi sæpe longi, porrecti; racemi breves vel longi, diu crescentes, complanati; bracteæ distichæ, lateraliter compressæ, persistentes. Flores majusculi, fugaces, singulatim intervallis longis expansi. Sepala petala subsimilia, ovata, subobtusa vel caudata. Labellum saccatum; lobi laterales falcati, medius sæpe carnosus; callus 1 (vel 2) parvus in disco situs. Columna breviuscula.

Species, sepalis petalisque haud caudatis.

THRIXSPERMUM LILACINUM, *Reichb. f.*, *Xenia Orch.*, ii. p. 121.
T. CALCEOLUS, *Reichb. f.*, *l.c.*, p. 122.
T. BRACHYSTACHYS, *Ridl.* *Sarcochilus brachystachys*, Hook. f.
T. PAUCIFLORUM, *Ridl.* *Sarcochilus pauciflorus*, Hook. f., Fl. Brit. Ind., vi. p. 41.
T. SERRÆFORME, *Reichb. f.*, *Xenia Orch.*, ii. p. 121.
T. CENTIPEDA, *Lour.*, *Fl. Cochinch.*, p. 520.
T. PURPURASCENS, *Reichb. f.*, *Xenia Orch.*, ii. p. 121.
T. OBTUSUM, *Reichb. f.*, *l.c.*

Species sepalis petalisque caudatis.

T. ARACHNITES, *Reichb. f.*, *l.c.*
T. SCOPA, *Reichb. f.*, *ex Hook. f.*, *Fl. Brit. Ind.*, vi. p. 40.
T. SCORTECHINII, *Ridl.* *Sarcochilus Scortechini*, Hook, f.
T. PURPURASCENS, *Reichb. f.*, *Xenia Orch.*, ii. p. 121.

T. LILACINUM, *Reichb. f.*, *Xenia Orch.*, ii. p. 121.

Sarcochilus lilacinus, Griff., Notul., iii. p. 334, et Ic. Pl. As., t. 320, fig. 2.

Hab. Singapore: common; Selitar, Changi, Ang Mo Kio!
Pahang: Pulau Chengei, Pekan!
Malacca: Ayer Panas!
Perak: Thaiping!
Also Java!

This plant grows scrambling through long grass and herbage in hot open marshes. The stems attain a length often of many feet. The flowers are showy, and vary from white to lilac according to the amount of exposure to the sun. The peduncle stands at right angles to the stem as a rule, and the pedicel of the flower stands at right angles to the rhachis. The flower is so placed that the apex of the lip points upwards, while the sepals, petals, and saccate portion of the lip are horizontal: a position which I do not remember to have seen as a normal

occurrence in any other orchid. The flowers open at intervals of about five days, and last about half a day in perfection.

Blume's *Dendrocolla amplexicaulis*, Bijdr., p. 288, is referred by Reichenbach to this species; but his description, such as it is, does not agree very well. He says "sepalis oblongis acutis, labello interne muricato."

THRIXSPERMUM CALCEOLUS, *Reichb. f.*, *Xenia Orch.*, ii. p. 122.
Sarcochilus Calceolus, Lindl., Bot. Reg. (1846) t. 19.
S. brachystachys, Hook. f., Fl. Brit. Ind., vi. p. 41.
Hab. Singapore: Sungei Morai! Pulau Ubin! Pulau Tekong Vesar! Kranji!
Johore: Tanah Runto! Kwala Batu Pahat, *Kelsall!*
Pahang: Pekan, Kwala Tenok, Tahan River!
Dindings: Telok Sera, *Curtis!*
Penang: Penang Hill, *Maingay* (in herb. Kew)!

This is a very common plant which, perhaps from the fugacious character of its flowers, seems to have escaped the notice of almost all the botanists in the peninsula. It was first described from a cultivated specimen sent by Cuming from the "Philippines."

It grows in masses on the ground, and especially on rocks on the banks of rivers or by the sea. The stems attain a length of 12 feet, and the short racemes are emitted at intervals all along them. The flowers here are large and pure white, except for a yellow spot round the epichil and a few red or orange dots at the entrance to the spur. They are deliciously scented. The plant would be well worthy of cultivation but that it seldom flowers, and when it does, the flowers last but a few hours.

The figure of *Sarcochilus pauciflorus*, Hook. f., in Scortechini's drawing resembles this in most points, but the description in 'Fl. Brit. Ind.' seems to be that of a distinct species.

T. PAUCIFLORUM, *Ridl.* *Sarcochilus pauciflorus*, Hook. f., Fl. Brit. Ind., vi. p. 41, was collected by Scortechini in the Thaiping Hills, Perak.

T. SCOPA, *Reichb. f.*, *ex Hook f.*, *Fl. Brit. Ind.*, vi. p. 40.
Hab. Perak: Larut (*King's Collector*).

T. SCORTECHINII, *Ridl.* *Sarcochilus Scortechini*, Hook. f., Fl. Brit. Ind., vi. p. 40.
Hab. Perak: *Scortechini.*

This looks like a gigantic *T. Arachnites*, Reichb. f.; I found a plant somewhat like it on rocks of Kedah Peak, but the flowers were not open.

THRIXSPERMUM ARACHNITES, *Reichb. f.*, *Xenia Orch.*, ii. p. 121.

Hab. Singapore: Selitar!
Johore: Batu Pahat!
Selangor: Bukit Hitam, *Kelsall!* Kwala Lumpur, Jelebu!
Penang: *Kunstler!*
Also India, Burmah, Assam, Java! Sumatra at Djambi! Borneo!

Evidently a common plant, but seldom collected as it is not often found in flower. *Sarcochilus borneensis*, Rolfe, in Illustr. Hortic., xxxix. (1892) p. 99, t. 161, looks like a finely-grown plant of this species.

T. LEUCARACHNE, *Ridl.*, *sp. nova.* *Caulis* 4–5 poll. longus, validulus, a vaginis omnino tectus, eo *T. Arachnitis* similis. *Folia* 6 poll. longa, ½ poll. lata, linearia, lorata, obtusa, apice inæqualiter biloba. *Pedunculi* cum foliis æquilongi vel paullo longiores; racemus breviusculus; bracteæ ¼ poll. longæ, acutæ. Sepala petala 3 poll. longa, anguste linearia, acuminata, patentia, alba. *Labellum* basi saccatum; lobi laterales elongati falcati acuti, medius longiusculus lanceolatus acutus albus basi kermesinus; lobi et discus violaceo-maculati, intus pubescentes; callus parvus, papilliformis, violaceus. *Columna* latiuscula, in lateribus recta, in ventre plana, basi haud dilatata, alba a fasciâ medianâ traversâ violascens. *Anthera* tenuis, unilocularis, pallide citrina, in margine antico truncata; pollinia elongata, elliptica angusta; caudiculus brevis, linearis.

Hab. Siam: Pungah, *C. Curtis!*

This is near *T. longicauda*, Ridl., from Borneo, but has longer and narrower leaves, closely approximated as in *T. Arachnites*, Reichb. f., of which the plant has much the habit. It differs from that species, however, in its much longer and narrower leaves, much larger flower, and different colouring. It is the prettiest species I have seen.

T. (§ RIDLEYA) NOTABILE, *Ridl.* *Sarcochilus notabilis*, Hook. f., Fl. Brit. Ind., vi. p. 42, et Ic. Pl., t. 2126.

Hab. Singapore: Chan Chu Kang! Bukit Mandai!

This very rare little plant has deep red leaves and pink flowers. It is so closely allied to *Thrixspermum* that, in spite of its curious entire lip and apparent absence of column foot, it can, I think, hardly be generically separated.

DENDROCOLLA.

Dendrocolla, *Blume, Bijdr.*, p. 291, *partim* (Sectio *Fornicaria*).

Strictly speaking the species of this genus have no spur and sometimes not even a saccate portion to the lip; but their affinity with *Thrixspermum* (which has the saccate lip of *Aerides*) cannot be doubted. The number of species described which I can certainly refer to this genus is but small; probably many more will be met with when more attention is paid to these small fugacious flowered plants. Besides the species described or mentioned below, the following should, I think, be referred here.

D. HYSTRIX, *Blume, Bijdr.*, p. 291.
Hab. Tenasserim et Java.

D. PULCHELLA, *Thw.*, *Enum. Pl. Zeyl.*, p. 430.
Hab. Ceylon.

D. MERGUENSIS, *Ridl.* *Sarcochilus merguensis*, Hook. f.
Hab. Mergui.

D. PUGIONIFOLIA, *Ridl.* *Sarcochilus pugionifolius*, Hook. f.
Hab. Ceylon.

D. ANGUSTIFOLIA, *Blume, Bijdr.*, p. 291.
Hab. Java.

D. SUBULATA, *Blume, Bijdr.*, p. 291.
Hab. Java.

D. ANCEPS, *Blume, Bijdr.*, p. 292.
Hab. Java.

Of some of these species, the flowers are only partially described, and in some not described at all. The species seem to have a remarkable predilection for orchard trees, especially mangosteens, and some are rarely to be met with elsewhere.

DENDROCOLLA MACULATA, *Ridl.*, *sp. nova.* *Caules* usque ad 3 poll. longi, graciles. *Folia* 4 poll. longa, ½ poll. lata, linearia, coriacea, apice biloba. *Scapus* 3 poll. longus, gracilis, strictus; racemi rhachis incrassata; bracteæ ovatæ, acutæ. *Flores* parvi; pedicelli longiusculi, graciles. *Sepalum* posticum lanceolatum spathulatum, lateralia similia basi dilatata, flava. *Petala* sepalis angustiora, lanceolata, spathulata, flava. *Labellum* sepalis brevius; lobi laterales rotundati obtusi denticulati pubescentes flavi kermesino-maculati, medius linearis pubescens flavus; saccus longiusculus obtusus; callus oblongus, retusus. *Columna* crassa; pes longiusculus, flavescenti-viridis; alæ latæ, incurvæ, inter se appressæ; clinandrium parvum, ovale. *Anthera* oblonga, obtuse longi-rostrata, alba; pollinia semi-elliptica; discus hippocrepiformis.

Hab. Singapore: Bukit Mandai!

I have only once had this plant brought to me. It is allied to *D. Trichoglottis*, but has much longer and narrower leaves, a longer and more slender peduncle, and the mid-lobe of the lip is a rather long linear process. The colouring, too, is quite different.

D. TRICHOGLOTTIS, *Ridl.* *Sarcochilus Trichoglottis*, Hook. f., Fl. Brit. Ind., vi. p. 39, et Ic. Pl., t. 2123. *Caulis* 2–6 poll. longus; radices longæ, copiosæ, albæ. *Folia* lorata, obtusa, inæqualiter biloba, canaliculata; vaginæ ferme ¼ poll. longæ, rugosæ compressæ. *Pedunculi* foliis sæpe breviores, validi; racemi rhachis incrassata. *Bracteæ* ovatæ, a mucrone crasso ⅛ poll. longo terminatæ: pedicelli ⅜ poll. longi. *Sepalum* posticum ¼ poll. longum lanceolatum acutum, lateralia postico multo latiora ovato-lanceolata acuta carinata inæquilatera pallide flava. *Petala* sepalis angustiora, spathulata, pallide flava. *Labellum* sepalis multo brevius, citrinum, basi obtuse saccatum; lobi laterales lati truncati erecti longe ciliati, medius brevissimus truncatus sub apice mucronulatus; callus parvus, oblongus, retusus, in disco inter lobos laterales situs; juxta callum macula aurantiaca adest; maculæ ochraceæ extra labellum in lobis lateralibus et e medio adsunt. *Columna* alba, brevis, lata, in ventre profunde canaliculata; margines crassi; pes tenuis, linearis, aurantiacus; clinandrium subprofundum; dentes 2 prope rostellum (verosimiliter stelidia) minuti. *Anthera* tenuis, ovata, obtusa, alba; pollinia minuta, oblonga,

inæqualiter biloba; rostellum planum, integrum, tenuissimum, album. *Stigma* profundum. *Capsula* 5 poll. longa, cylindrica, gracilis.

Hab. Singapore: very common on orchard trees, in gardens and elsewhere often doing considerable injury by overloading the boughs and eventually killing them.
Pahang: Pekan!
Perak: Kwala Kangsa!

The figure in the 'Icones Plantarum,' t. 2123, was partly based on a drawing I sent to Kew, which was taken from a flower partly withered, and fertilized. The flowers are so fugacious, that unless they are carefully watched they cannot be got in good condition. The sepals are very unequal; the lateral ones having the lower margin at the base prolonged downwards, as if to form a mentum. The lip has the ordinary form of a *Dendrocolla*, the lateral lobes being turned up, and they as well as the disc behind the callus are covered with white hairs. The column as figured in the 'Icones' represents that of a fertilized flower, the sides and the upper edge of the clinandrium having folded in over the stigma.

DENDROCOLLA PARDALIS, *Ridl.* *Sarcochilus pardalis*, Ridl. in Trans. Linn. Soc., Ser. II. (Bot.) iii. (1893) p. 371.

Hab. Pahang: thickets along the River Pahang!

D. CARINATIFOLIA, *Ridl.* *Sarcochilus carinatifolius*, Ridl. in Journ. As. Soc., Straits branch (June, 1891) p. 136.

Hab. Pulau Aor, *J. Feilding!*

This little plant, which I obtained in Christmas Island, south of Java, was found in abundance in Pulau Aor, an island lying east of Johore, by Mr. Feilding. It has not yet appeared on the mainland. The lip with its long falcate lateral lobes and well-developed epichil somewhat resembles that of a *Thrixspermum*.

Sarcochilus recurvus, Hook. f., Fl. Brit. Ind., vi. p. 39, et Ic. Pl., t. 2122, is, I fear, unrecognisable with certainty. It was described from flowerless specimens. It might be *D. pardalis*, or one of the others of this group; but there are a number of which my materials are insufficient, which would pretty well suit the figure.

D. FILIFORMIS, *Ridl.* *Sarcochilus filiformis*, Hook. f., Fl. Brit. Ind., vi. p. 39, et Ic. Pl., t. 2124. *Caulis* 2–4 poll.

longus. *Folia* 4–5, 6 poll. longa, gracilia, teretia, acuta, viridia roseo-punctata; vaginæ ½ poll. longæ, teretes, ore integræ. *Racemi* 3–4, singuli vel bini, 3 poll. longi, laterales, patentes. graciles, teretes, basi longe nudi; rhachis florifera ½ poll. longa, teres, incrassata; bracteæ minimæ, ovatæ, obtusæ. *Flores* singulatim intervallis longis expansi, albi, odori; pedicelli cum ovariis 3 poll. longi, albi. *Sepala* ½ poll. longa, ⅛ poll. lata, lanceolata obtusa, alba roseo-tincta. *Petala* sepalis paullo minora. *Labellum* sepalis multo brevius, basi angustatum; discus excavatus; lobi laterales erecti rotundati obtusi aurantiaci, medius oblongo-ellipticus obtusus carnosus pulverulentus flavus. *Columna* longiuscula, crassiuscula, curva, albescens; margines superne dilatati appressi, basi divergentes; clinandrium vix depressum, subquadratum, in margine kermesinum. *Anthera* oblonga, quadrata, tenuis, depressa, alba, in margine antico excavata; pollinia cuneata, aurantiaca; caudiculus brevis, late spathulatus; discus ovalis, ruber. Stigma in margine basali rotundato kermesinum, a marginibus columnæ incrassatis ferme tectum.

Hab. Singapore: Bukit Mandai! Rare; Chan Chu Kang, on mangosteen trees in an old orchard! Dalvey Road!
Perak: *Scortechini.*

I make no apology for re-describing this, as the type-specimen figured in the 'Icones' was admittedly a bad one; and these plants, owing to the fugacity of their flowers, require to be described from living specimens.

DENDROCOLLA FULGENS, *Ridl., sp. nova.* *Caules* 3–4 poll. longi, graciles; radices tenues, albæ. *Folia* 1 ped. longa, teretia, subacuta, pendula. *Pedunculus* 1½–3 poll. longus, gracilis, teres. *Racemus* 8 poll. longus vel ultra, crassus. *Bracteæ* ovatæ, acutæ, recurvæ, approximatæ. *Flos* explanatus 1 poll. latus, pulcher. *Sepalum* posticum lineari-oblongum, lateralia lanceolata acuta, rubra. *Petala* linearia, spathulata, rubra. *Labellum* glabrum, breviter lineari-unguiculatum, aurantiacum; lamina cordata, obtusa lateribus suberectis; callus rotundatus, pubescens in basi laminæ adest; fasciæ et maculæ rufæ in lateribus et in ungue adsunt. *Columna* brevis, flammea; pes longiusculis; clinandrium planum, marginibus paullo elevatis. *Anthera* plana, ovata, bilocularis, flava; pollinia 2, ovoidea; caudiculus spathulatus, latus; discus subtriangularis. *Stigma* cordatum. *Capsula* 1½ poll. longa, teres.

Locality uncertain. I received this from a tree in the garden of Mr. Rauch in Singapore. The plants were not known to have been introduced, but it is quite possible that they came originally from Sumatra. *Bulbophyllum Ephippianthus* was growing with it.

The habit of the plant is that of *D. filiformis*, mihi; but the bracts are longer and recurved, the flower has the sepals and petals of a fine dark red, the lip is quite glabrous, except the pubescent callus, and hastate-cordate in shape, hardly saccate at all. It is of a bright orange yellow with reddish bars on the sides, and some red spots on the claw. The column is of a red orange. It is the prettiest species I have yet seen.

TRIBE *NOTYLIEÆ*.

ACRIOPSIS, Reinw.

A. JAVANICA, *Reinw. ex Blume, Cat. Gew. Buitenz.*, p. 97, *et Blume, Bijdr.*, p. 377.

Hab. Singapore: common; Changi! Kranji! Tanglin, &c.!
Johore: Gunong Pulai! Bukit Murdom! Batu Pahat!
Malacca!
Sungei Ujong!
Selangor: Kwala Lumpur!
Penang: Balik Pulau! Penang Hill, *Curtis!*
Perak: Maxwell's Hill! Hermitage Hill!
Pahang: Pekan, Kwala Pahang!

A very common plant usually to be found on orchard or roadside trees. It varies a good deal in size of pseudo-bulb, breadth of foliage, and development of panicle. I once found a quantity growing in tufts of grass on the sea-shore at Kwala Pahang. It is called "*Angrek Darat*" (sea-shore orchid), "*Sakat Bawang*" (onion-epiphyte), and "*Sakat Ubat Kapialu*" (epiphyte, medicine for headache) by the natives. The roots and leaves are boiled to make a drink for fever.

A. INDICA, *Wight, Ic.*, v. t. 1748.
Hab. Penang: *Maingay.*

A. PURPUREA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 406.

Hab. Pahang: near Pekan.
Also Borneo!

Acriopsis Ridleyi, *Hook. f., Fl. Brit. Ind.*, vi. p. 79.

Hab. Singapore: Bukit Mandai!

The only specimen known is one which was found on a pepper post in Bukit Mandai. It had, I think, been planted there; having been found in the jungle close by when the forest was felled to make the pepper garden.

THECOSTELE, Reichb. f.

T. maculosa, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 374.

Collabium Wrayi, Hook. f., Fl. Brit. Ind., v. p. 784, et Ic. Pl., t. 2065.

Hab. Pahang: Tahan River!
Kedah: Jan!
Perak: Taiping!

T. Zollingeri, *Reichb. f. in Bonplandia*, v. (1857) p. 37.

Hab. Perak: Waterloo Estate, Kwala Kangsa Valley, *Curtis!*
Penang: Government Hill, *Curtis!*

T. secunda, *Ridl. in Journ. Linn. Soc. Bot.*, xxxi. (1896) p. 299.

Hab. Perak: Thaiping!
Also Borneo.

T. Maingayi, *Hook. f., Fl. Brit. Ind.*, vi. p. 20.

Hab. Malacca: *Maingay.*

T. quinquefida, *Hook. f., Fl. Brit. Ind.*, vi. p. 20.

Hab. Malacca: *Maingay.*

Subtribe *PODOCHILEÆ.*

The erect elongate rostellum serves to distinguish this group.

PODOCHILUS, Blume.

P. unciferus, *Hook. f., Fl. Brit. Ind.*, vi. p. 81, *et Ic. Pl.*, t. 2145.

Appendicula purpurascens, Blume, Bijdr., p. 302; De Vriese, Illustr. [t. 12, f. 1].

Hab. Perak: *Scortechini*, Maxwell's Hill!
Pahang: Kota Glanggi, on limestone rocks!
Also occurs in Java and Sumatra!

There is a fairly good drawing of this in De Vriese's illustrations. It is very dissimilar in habit, and in several other points differs from the rest of the genus. The stems are long, pendulous, and weak. The racemes are very slender, and usually bear several flowers; but these develop one by one at a few days' interval of time. The flowers are pale rose colour, deepening into crimson at the apices of the petals and sepals; the lip is white with a crimson violet apex; towards the apex of the lip are two blunt linear calli. The appendage is linear oblong retuse. The pollinia are six in number on pedicels. These pedicels are spoon-shaped, broader than the pollinia, which are planted at the base of the broad portion and are but little longer than it. The disc is round. The rostellum is very small; shorter indeed than the raised edge of the clinandrium.

PODOCHILUS LUCESCENS, *Blume, Bijdr.*, p. 295, t. 12, *et Rumphia*, iv. p. 43.

Hab. Kedah: Gunong Rayah, alt. 2,500 feet, abundant; *Curtis*, n. 2559!

P. MICROPHYLLUS, *Lindl. in Wall. Cat.*, 7335 A, *et Gen. et Sp. Orch.*, p. 234, partim.

Hab. Singapore: Chan Chu Kang, Ang Mo Kio, Kranji!
Johore: Gunong Pulai!
Malacca: Mt. Ophir!
Pahang: Tahan River!
Penang: Government Hill! Bukit Laksamana, *Curtis.*
Kedah: Kedah Peak!

Common on mossy trees and rocks. The flowers are white, except for a crimson spot towards the apex of each petal and one on the disc of the lip.

P. ACICULARIS, *Hook f.*, *Fl. Brit. Ind.*, vi. p. 82, *et Ic. Pl.*, t. 2147.

Hab. Perak: rocks at the Waterfall, Thaiping!
Penang: *Maingay!*
Pahang: Tahan Woods, on trees!
Kedah: Kedah Peak!

This mossy-looking plant usually is to be found creeping over damp rocks; but it sometimes grows on slender trees, covering them with a mat of stems. It comparatively seldom flowers. The flowers are white.

APPENDICULA, Blume.

The variation in the form of the number and form of the pollinia in this genus is very striking. Some species, *e.g. A. pendula*, Blume, have eight very unequal pollinia, connate at a point near the base, with a very short pedicel. *A. callosa*, Blume, has also eight; but they are nearly equal, slender, and quite free to the disc. *A. reflexa*, Blume, has six, with hardly any pedicel, *i.e.*, they are free on the disc nearly to the base. *A. bifaria*, Lindl., again has eight, two of which are rudimentary; grouped in two bundles, on one fairly long pedicel. *A muricata*, Teysm. and Binn., has but four, seated on a very long pedicel, slender at the base and widening upwards into a spoon-like termination. *Podochilus unciferus*, Hook. f., has a similar arrangement, except that there are six pollinia, with two spoon-shaped pedicels, each of which bears three pollinia. The form of the anther-cap and rostellum vary correspondingly; being short and broad in the forms with short pollinia and no pedicel, and longer in the others. It becomes indeed not easy to separate the two genera, *Podochilus* and *Appendicula.* The former appears generally to have a rudiment at least of the third pair of pollinia, and does not always have the pedicel split to the disc. Usually it has the reflexed lamina-like callus, at the base of the lip; and this may perhaps be taken as its best characteristic. But both genera require much study from living specimens before they can be satisfactorily classified.

A. BIFARIA, *Lindl. in Hook., Kew Journ.*, vii. (1855) p. 35.
Hab. Singapore: Sungei Morai! Kranji! Bukit Timah!
Malacca: Lower woods of Gunong Mering, Ophir Ranges!
Pahang: River Tahan!
Selangor: Kwala Lumpur, *Kelsall*, Bukit Hitam!
Penang: Government Hill!
Kedah: Gunong Raya, 2,500 feet alt., *Curtis!*
Perak: *Scortechini.*
Also Rhio! and Borneo!

On trees in mangrove swamps or dense jungle. Flowers white. Plants with lateral racemes often occur; and in some of these the callus is more two-lobed, and the lip slightly three-lobed; while in others the callus is quite entire and the lip rounded or even acute at the tip, so that the var. *Wallichiana* can hardly, I think, be kept up.

The pollinia are very long and slender, tapering into the pedicel. Six are large and apparently fully developed; the other two (the inner ones in each fascicle) are much smaller and slenderer, and apparently abortive. The pedicel is short in comparison with the pollinia, and the disc lanceolate acute.

APPENDICULA CALLOSA, *Blume, Bijdr.*, p. 303.
Hab. Singapore: Sambanang, Sungei Morai, Bukit Timah!
Johore: Gunong Panti, alt. 1,000 feet! Kwala Kahan! *Kelsall.*
Malacca: Gunong Mering, Ophir range!
Perak: Maxwell's Hill!
Penang: Government Hill, *Curtis!*
Pahang: Tahan River!
Sungei Ujong: Bukit Sula! *N. Cantley.*

A very common plant in mangrove swamps or dense jungle, flowering all the year. The flowers appear one or two at a time; they are pure white, except for the thick yellow callus on the lip, and the base of the lip, and violet-rose apices of the stelidia. The lip is parallel and adnate by its edges to the column for the greater part of its length, then abruptly bent just before the mid-lobe, at the bend between the raised lateral lobes, and passing on to the mid-lobe is a thickened yellow patch, which is the transverse appendage of the description in the 'Flora of British India.' It evidently corresponds to the epichiliary ridges and calli of other orchids and not to the basal callus (appendage) of *Podochilus.* I do not see that it is tubercled, as described. The mid-lobe is channelled in the centre. It is usually as broad or broader than the hypochilary portion. The mentum is full of nectar. Owing to the approximation of the thickened disc between the two lateral lobes, the entrance to the mentum is very small. The anther is rather tall, with a blunt beak, and is partially divided in two by a couple of thin walls. The pollinia are eight, very thin and transparent, unequal and narrowly obliquely pyriform in outline. They are free to the disc, there being no pedicel. The disc is large, circular, and brown in colour. The clinandrium is deep with a median ridge. The filament of the anther-cap is short but distinct, broad and truncate. The rostellum is long and entire.

APPENDICULA ELONGATA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 375.

Hab. Pahang: Trees overhanging the River Tahan! 2371.

A. LEWISII, *Griff. in Calc. Journ. Nat. Hist.*, iv. (1844) p. 378, t. 19, *et Ic. Pl. As.*, t. 337.

Hab. Singapore: *Wallich.*
Penang: West Hill, *Curtis*, 993!
Perak: *Scortechini*, *Wray.*

A. COMPLANATA, *Ridl.*, *sp. nova. Caules* 1 ped. longi, complanati, pallide virides. Folia subremota, lanceolata, submembranacea, basi rotundata, apice inæqualiter bifida obtusa longiuscule mucronata, conspicue 3-nervia; vaginæ ½ poll. longæ, ancipites, ore integræ obliquæ. *Racemi* ½ poll. longi, terminales rarius laterales. *Bracteæ* lanceolatæ, subobtusæ, reflexæ. *Flores* parvi, virescenti-albi; ovaria cum pedicellis brevia. *Sepala* ovata, obtusa; mentum breve, scrotiforme, obtusum. *Petala* sepalis paullo minora. *Labellum* sepalis brevius, adnatum, ovatum, obtusum, album in fauce purpureo-2-lineatum. *Columna* brevis, superne purpurea; pes latus. *Anthera* ovato-lanceolata acutæ, minute pustulata, kermesina; pollinia 6, inæqualia, clavata, pallide flava; discus minimus, lanceolatus, obtusus, rufus; rostellum ovatum, acutum, breviter bifidum, viride in medio purpureum. *Stigma* latum, in margine inferiore sinuatum: stelidia 0; caudiculus majusculus, ovatus, acutus.

Hab. Selangor: Bukit Hitam, *Kelsall!*
Johore: Gunong Pulai!

Remarkable for its flattened stem, which appears slightly winged when dry. The foliage is rather thin, and dries green.

A. MAINGAYI, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 85, *et Ic. Pl.*, t. 2151.

Hab. Perak: *Scortechini.*
Penang: West Hill, *Curtis!*

APPENDICULA LANCIFOLIA, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 84, *et Ic. Pl.*, t. 2150.

Hab. Perak: Gunong Batu Putih, alt. 3,000–4,000 feet (*King's Collector*), Maxwell's Hill, alt. 3,000 feet!

The plant, which I found at the above-mentioned locality, had green, inconspicuous flowers. It was, however, nearly over; and the lips, which are not adnate to the column, had fallen away from the flowers; but I believe this to be the species figured and described. It has distinct, though short, truncate stelidia.

A. UNCATA, *Ridl.*, *sp. nova.* Elata, ultra-pedalis. *Folia* 2 poll. longa, ⅝ poll. lata, oblongo-lanceolata, submembranacea, distincte 3-nervia, apice inæqualiter biloba mucronulo interjecto; vaginæ ⅜ poll. longæ, subteretes, superne ampliatæ. *Racemi* ½ poll. longi, subterminales aut laterales, penduli, basi sæpe nudi. *Bracteæ* majusculæ, cymbiformes, ovatæ. *Flores* c. 10, virides. *Sepala* ovata acuta; mentum majusculum obtusum. *Petala* sepalis breviora, ovata-lanceolata. *Labellum* integrum, oblongum, apice rotundatum, liberum; callus in disco situs indivisus. *Columna* brevis, crassa. *Anthera* elongata, lanceolata, acuta; stelidia 0. *Rostellum* magnum, lanceolatum, triangulare, bifidum. *Stigma* grande, hemisphæricum, marginatum.

Hab. Selangor: Pataling, near Kwala Lumpur, on an old tree in dense jungle!

This is allied closely to *A. pendula*, Blume, and *A. lancifolia*, Hook. f.; but the former has a broad adnate lip, and the latter has longer racemes, and indistinct nerves on the leaves, and no callus on the lip.

A. REFLEXA, *Blume, Bijdr.*, p. 301. *Caules* ferme 2-pedales, validuli. *Folia* 1 poll. longa, ½ poll. lata, oblongo-elliptica, approximata, tenuiter coriacea, superne canaliculata, atroviridia subtus pallidiora, in sicco nigricantia, apice ferme æqualiter biloba mucrone interjecto; vaginæ ½ poll. longæ, teretes, haud ampliatæ, ore obliquæ. *Racemi* ½ poll. longi, plures, laterales, basi a bracteis paucis lanceolatis acuminatis ornati, superne a floribus congestis tecti. *Bracteæ* florales lancolatæ, obtusæ, reflexæ. *Flores* minimi. *Sepalum* posticum lanceolato-ovatum obtusum, lateralia multo majora ovata; mentum cum sepalis æquilongum, obtusum. *Petala* parva, linearia; sepala petala

viridia. *Labellum* album calceolatum; lobus medius ovatus, acutus, recurvus. *Columna* brevis, crassa. *Anthera* ovata, tenuis, bilocularis, breviter rostrata; pollinia 6, pyriformia, subæqualia; discus parvus, bruneus. *Stigma* latum, haud profundum. *Capsula* sessilis, oblonga; costæ elevatæ, æquales.

Hab. Johore: Batu Pahat!

Also Buitenzorg, in Java, *Dr. Treub.*

Blume's description is very short; but as far as it goes, it agrees with this species. The flowers are remarkably small. *A. cordata*, Hook. f., is near this, if not identical.

APPENDICULA TORTA, *Blume, Bijdr.*, p. 303.

Hab. Selangor: limestone caves, Kwala Lumpur!

Perak: Maxwell's Hill!

Flowers pale yellow, with a crimson anther. I do not understand how Reichenbach's *A. rhodiola*, Xenia Orch., ii. p. 118, differs from this species. I have received plants from Dr. Treub, from Java, and also collected it in the abovementioned localities; and in all the bracts of the inflorescence were of a creamy white, and not pink.

A. XYTRIOPHORA, *Reichb. f. in Seem. Fl. Vit.*, p. 299.

Hab. Perak: *Scortechini.*

A. RUPESTRIS, *Ridl., sp. nova.* Cæspitosa, rupicola. *Radices* copiosæ; rhizoma breve, crassiusculum. *Caules* 8 poll. longi, plures, teretes, graciles. *Folia* $\frac{3}{4}$ poll. longa, $\frac{1}{8}$ poll. lata, lanceolato-linearia, apice truncata emarginata longius mucronulata; vaginæ $\frac{1}{8}$ poll. longæ, superne ampliatæ. *Racemi* $\frac{1}{2}$–$1\frac{1}{2}$ poll. longi, terminales, basi a bracteis paucis linearibus tecti. *Bracteæ* florales lanceolate subacutæ, deflexæ. *Flores* parvi. *Sepalum* posticum ovatum, lateralia majora; mentum breve, rectum, obtusum. *Petala* sepalis minora lanceolata; sepala petala alba. *Labellum* oblongo-ellipticum obtusum, fere liberum, ecallosum. *Columna* brevis; pes longus. *Anthera* rotundata, bilocularis; rostellum breve, bifidum. *Stigma* latum, rotundatum; clinandrium profundum; stelidia 0.

Hab. Pahang: Rocks in the stream, Tahan River!

This grows in clefts in the rocks in the Tahan River. It has a thick though short rhizome, emitting copious roots. The stems are very slender, and covered with grassy leaves. The flowers are very small. The lip is free from the column to the base, quite entire, with the edges at the apex thickened.

APPENDICULA MURICATA, *Teysm. and Binn. in Tijdschr. Nederl. Ind.*, xxiv. (1862) p. 322.

A. echinocarpa, Hook. f., Fl. Brit. Ind., vi. p. 85, et Ic. Pl., t. 2152.

Hab. Perak: *Scortechini*.
Kedah: Kedah Peak, alt. 3,000 feet, common!
Java: Mt. Salak, *Teysmann*.

Teysmann and Binnendijk's description of this plant is really a good one, and I think it is quite clear what they intended. The only differences I note between their plant and the Kedah one are that they describe the sepals as "violascentia apice lutescentia"; whereas the Kedah plant has them of a greenish white; the petals are described as linear, whereas I should call them lanceolate. The sepals, which are slightly keeled, are covered, as in the ovary, with remarkable crystalline processes. The lip bears, on the upper side at the apex, a short conical tooth. The column is somewhat remarkable; it has a pair of broad stelidia, one angle of which is acute. The stigma is terminal; but the front margin projects beyond the stelidia. The whole of it, including the viscid fluid on its surface, is amethyst crimson. The very long rostellum and anther are erect and stand far behind it. The anther has a fairly long, slender, emerald green filament. The base is nearly globose and it ends in a long slender beak. The pollen masses are four only, thin, lanceolate, and nearly equal. They are fixed to the outer face of the upper part of the very long spoon-shaped pedicel. The disc is elliptic, fairly large, and buff coloured. The rostellum is large, the edges involute, the apex shortly bifid.

The plant grows on trees low down, forming large tufts.

A. LUCIDA, *Ridl., sp. nova.* *Caules* 6 poll. longi, plures, congesti, erecti. *Folia* $\frac{3}{4}$ poll. longa, $\frac{1}{2}$ poll. lata, cordata, ovata, amplexicaulia, polita, atroviridia, apice inæqualiter biloba, minute mucronata; vaginæ $\frac{1}{4}$ poll. longæ, striolatæ. *Paniculæ* $\frac{1}{4}$ poll. longæ, axillares; rami plures, tenues. *Bracteæ* breves, ovatæ, acutæ. *Flores* minuti, albescenti-virides; pedicelli tenues. *Sepalum* posticum ovatum obtusum aut subacutum, lateralia ovata subacuta; mentum saccatum. *Petala* sepalo postico paullo breviora, lanceolata; sepala petala virescentia, a lineis medianis purpurascentibus ornata.

Labellum integrum, album, basi oblongum, apice (epichilio) ovato-orbiculare deflexum; callus medianus conicus adest. *Columna* crassa, alba. *Anthera* pyriformis, obtuse rostrata; pollinia 6, angusta, elongata, inæqualia, in discum ovatum attenuata; rostellum lineari-oblongum, bifidum. *Stigma* columnâ latius, quadratum, purpureo-marginatum.

Hab. Singapore: Kranji! Chan Chu Kang!
Selangor: Seppan!
Also Rhio.

A tufted plant remarkable for its shining dark green leaves and branching inflorescence of minute flowers. When dry, the whole plant becomes black. It is common on trees in mangrove swamps and banks of tidal rivers.

THELASIS, Blume.

T. ELONGATA, *Blume*, *Orch. Archip. Ind.*, p. 23, t. 7, fig. 2, *et* t. 5, fig. C.

Hab. Singapore: Kranji, on mangroves! &c.
Johore: Batu Pahat!
Pahang: Pekan!

The common plant is so similar to Blume's figure, that I have no doubt as to its being the plant he intended. It is abundant on the branches of trees in mangrove swamps. Cuming's n. 2062, Philippines, looks exactly the same to me.

It is a small insignificant plant with light green flowers.

Var. MAJOR, *Ridl.*, *var. nova.* Omnino major et validior. Pseudo-bulbi ferme pollicares. Folia 4 poll. longa, ½ lata. Scapi 5 poll. longa, validi; vagina in medio ⅛ poll. longa. Spica crassa. Bracteæ majores.

Hab. Selangor: Kwala Lumpur, *Kelsall!*
Pahang: Tahan River Woods!

Different as this form looks from the common little stunted plant, I can only think it is a much larger and stronger variety, growing in wetter, more shaded, spots.

T. CAPITATA, *Blume*, *Bijdr.*, p. 386, *et Orch. Archip. Ind.*, p. 20, t. 7, fig. 1.

Hab. Perak: *Scortechini.*

T. MACROBULBON, *Ridl.*, *sp. nova.* *Radices* tenues copiosæ. *Pseudo-bulbus* e 2 nodis structus; nodus inferior ½ poll. longus

subglobosus, superior $\frac{1}{2}$ poll. longus cylindricus a vaginâ folii inferioris tectus. *Folia* 2, inferius 1 poll. longum, $\frac{1}{4}$ poll. latum, lanceolatum, superius 4–6 poll. longum, 1 poll. latum, lanceolatum vel ellipticum obtusum petiolatum. *Scapi* 6–10 poll. longi, laterales, erecti vel nutantes, in $\frac{1}{2}$ parte inferiore (vaginis paucis acuminatis exceptis) nudi; racemus laxus, multiflorus. *Flores* parvi, sessiles, virides. *Bracteæ* $\frac{1}{8}$ poll. longæ, lanceolatæ cuspidatæ. *Sepala* oblonga obtusa, ecarinata. *Petala* sepalis minora. *Labellum* petalis brevius magis carnosum, lanceolatum subacutum. *Anthera* lanceolata, acuta; pollinia 4, parva, glabra. *Rostellum* antherâ longius, ovatum acuminatum, profunde bifidum.

Hab. Maxwell's Hill, on a fallen tree!

A very distinct plant, with the pseudo-bulbs of *T. longifolia*, Hook f., but with two well-developed but unequal broad leaves, and a very different lip. The rostellum is bipartite; as, indeed, it is also in *T. elongata*, Blume, so that this cannot be used as a distinguishing character for *Oxyanthera*.

OXYANTHERA, Brongn.

O. ELATA, *Hook. f.*, *Ic. Pl.*, t. 2156.
Thelasis elata, Hook. f., Fl. Brit. Ind., vi. p. 87.
Hab. Singapore: Kranji! Sungei Buloh! Sungei Morai!
Pahang: Kwala Pahang, Kota Glanggi!
Perak: Thaiping Hills!
Penang: Government Hill, *Maingay*.
Also Djambi in Sumatra! and Borneo!

A common plant, with insignificant greenish and buff flowers.

O. DECURVA, *Hook. f.*, *Ic. Pl.*, t. 2157.
Thelasis decurva, Hook. f., Fl. Brit. Ind., vi. p. 87.
Hab. Singapore: Sungei Morai, Selitar! Kranji! Bukit Mandai, Serangoon, &c.!
Penang: *Maingay*.
Pahang: Tahan River!

I have it also from Pulau Condore near Saigon, Rhio, Borneo, and Djambi in Sumatra.

It is common in mangrove swamps, &c.

In the figures of both of these species in the 'Icones Plantarum'

the flowers are made to spread widely open. In nature they are closed, and only the tips of the sepals and petals separate.

TRIBE *NEOTTIEÆ.*

GALEOLA, Lour.

G. JAVANICA, *Benth. et Hook. f., Gen. Pl.*, iii. p. 590.

I found a single plant of what may be this species in the jungle on Maxwell's Hill in Perak.

G. ALTISSIMA, *Reichb. f., Xenia Orch.*, ii. p. 77.

Hab. Singapore: Chan Chu Kang!
Johore: Bukit Murdom! Gunong Panti!
Penang: *Curtis.*
Perak: *Scortechini.*

G. HYDRA, *Reichb. f., Xenia Orch.*, ii. p. 77.

Hab. Singapore: Kranji! Sungei Buloh!
Johore: Gunong Taning!
Selangor: Kwala Lumpur, *C. Curtis!*
Perak: Thaiping Hills, at Maxwell's Hill! and Waterloo Estate!
Siam: Bangtaphan, *Dr. Keith!*

These curious plants appear in the most unexpected places, sometimes covering old stumps, or climbing up tree trunks in thick jungle, sometimes in hot and dry exposed grass fields, and I have even seen them clambering on roofs of native huts.

VANILLA, Swartz.

V. GRIFFITHII, *Reichb. f. in Bonplandia*, ii. (1854) p. 88.

V. albida, Hook. f., Fl. Brit. Ind., vi. p. 91 (non Blume).

V. tolypephora, Ridl. in Trans. Linn. Soc., Ser II. (Bot.) iii. (1893) p. 376.

Hab. Singapore: on Pulau Ubin, abundant!
Selangor: Bukit Hitam, *Kelsall!*
Malacca: *Griffith.*
Perak: fide Hooker f., l.c.
Penang: Waterfall Hill! and Telok Bahang, *Curtis!*

I have also seen this plant on the Carimon Islands. The natives call it "*Telinah Kerbau Bukit,*" and "*Akar Punubal.*"

They pound up the flowers with water, and rub the paste over the body in cases of fever; and also use the leaves mashed with oil to thicken and strengthen the hair. The whitish latex of the plant has a very irritating action on the skin.

I met with a plant in Pahang with larger and blunter leaves, which was out of flower, and may be a distinct species.

I believe that Griffith's description of a *Vanilla* (Notulæ, iii. 247), and the figure (Ic. Pl. As., t. 281), is intended for this species, and consequently Reichenbach's *V. Griffithii*, l.c., is the oldest name. There are, however, some slight differences between the Singapore plants and Griffith's figure and description, and no locality is given for the latter.

CORYMBIS, Thouars.

C. LONGIFLORA, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 92.

Hab. Singapore: Pulau Ubin! Choa Chu Kang!
Malacca: Selandor! Panchor!
Selangor: Kwala Lumpur!
Perak: Gunong Hijan! Thaiping Hills!

It is really difficult to separate the species of this genus satisfactorily; and I think it highly probable that a good suite of specimens will show that all or nearly all the named species are merely forms of one.

C. Thouarsii, Reichb. f., from Africa and its islands is, according to Blume's figure (Orch. Archip. Ind., t. 44, fig. 1, A—C.), distinguishable by its narrower perianth segments; and *C. veratrifolia*, Reichb. f., has shorter flowers than *C. longiflora*, Hook. f., in which, too, I find the sepals and petals are more spathulate and the latter more crisped along the edge. The height of the plant and form of leaf are characters too variable to be of any value; and I am very doubtful as to the value of the length of the capsule, and proportionate size of the column.

C. longiflora, Hook. f., is widely scattered over the peninsula, and sometimes may be found in abundance; but it seldom flowers. It is an inhabitant of damp dark jungle, sometimes growing on rocks. The flowers are pure white and deliciously scented. The natives call it "*Lulumbah Payah*," *i.e.*, Marsh *Curculigo.*

C. RHYTIDOCARPA, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 92.

Hab. Perak: *Scortechini*, *Wray*.

CORYMBIS BREVISTYLIS, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 92.
Hab. Perak: limestone rocks (*King's Collector*).

TROPIDIA, Lindl.

T. SQUAMATA, *Blume*, *Orch. Archip. Ind.*, p. 123, t. 41.
Hab. Malacca: Mt. Ophir! Ayer Pannas! Panchor!
Selangor: Bukit Hitam, *Kelsall!*
Perak: Maxwell's Hill!
Kedah: Kedah Peak (n. 5129)!

Not rare, but very seldom flowering. The flowers are greenish-white, sweetly scented of vanilla. It grows in dense, shady woods. Plants cultivated in Singapore closely resembled Blume's drawings. Perhaps the *T. graminea* of the 'Fl. Brit. Ind.,' vi. p. 93, of which only one specimen was seen, and that from a locality where *T. squamata* is abundant, is a form of this. Blume figures no floral details of *T. squamata.* They much resemble those of *T. graminea*, except that there are no crests on the lip. He distinguishes it by its broader leaves, and lateral racemes.

T. MAINGAYI, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 93.
Hab. Malacca: Mt. Ophir!

T. CURCULIGOIDES, *Lindl.*, *Gen. et Sp. Orch.*, p. 497, *et in Wall. List*, n. 7386.
Hab. ? Perak: *Wray* (Hook. f., Fl. Brit. Ind., vi. p. 93).

I have seen nothing here like this species, and the specimen in Herb. Kew looks not unlike *T. squamata*, Blume.

VRYDAGZYNEA, Blume.

V. ALBIDA, *Blume*, *Orch. Archip. Ind.*, p. 75, t. 19, f. 2.
Hab. Singapore: Chan Chu Kang! Bukit Mandai! Choa Chu Kang!
Perak: Padang, *Wray*.

A tolerably abundant little plant in some of the damp dense jungles. The margins of the leaves are often undulate; but I think Scortechini's drawing n. 5, referred doubtfully to this, may be rather *V. lancifolia*, Ridl. The "glandulæ pedicellatæ" in the spur in this genus rise from the column just below the rostellum in the buds; and descend with the spur, lengthening as it lengthens, eventually becoming attached to it.

VRYDAGZYNEA GRACILIS, *Blume, Orch. Archip. Ind.*, p. 72, t. 17, *et* t. 20, fig. 1.

Hab. Perak: Horum, *Scortechini.*

V. LANCIFOLIA, *Ridl., sp. nova. Rhizoma* sæpe longum. *Caules* 6–9 poll. longi, erecti, succulenti. *Folia* 1½–3 poll. longa, ¼–¾ poll. lata, lanceolata, acuta, obliqua, viridia, basi sæpe acuta; petiolus ¼–½ poll. longus. *Pedunculus* brevis vel longiuscula; racemus usque ad 2 poll. longus, multiflorus, densus, cylindricus. *Flores* glabri; bracteæ ⅛ poll. longæ, lanceolatæ acuminatæ. *Sepala* lanceolata, lateralia latiora falcata. *Petala* sepalo postico agglutinata breviora, in marginibus tenuia. *Labellum* petalis multo brevius, oblongum, obtusum; margines involuti; linea mediana tenuis, glabra, elevata; calcar subcylindricum, obtusum; glandulæ globosæ, in pedicellis brevibus brevissime liberæ. *Columna* brevis, crassa; rostelli lobi oblongi, obtusi. *Anthera* ovata, glanduloso-cristata. *Capsula* ferme ¼ poll. longa, ovoidea, superne attenuata.

Hab. Singapore: Bukit Timah!
Johore: Gunong Panti!

Abundant by streams, and in wet spots in dense jungle on Bukit Timah. The leaves, which are very variable in size, are much narrower in proportion to their length than in other species, often narrowly lanceolate and acute at both ends. The two lateral nerves and the keel are prominent. Usually the leaves are tufted at the top of the stem; but sometimes the stem is leafy throughout. The raceme is often nearly sessile when young, but the peduncle continues to grow as the raceme lengthens. The flowers are white, but the tips of the sepals are commonly tinted with pink.

V. TRISTRIATA, *Ridl., sp. nova. Caules* 6 poll. longi. *Folia* 1½ poll. longa, ½ poll. lata, ovata, acuta, tenuia, remota, olivacea, roseo-3-striata. *Racemus* foliis brevior, subsessilis, densus, multiflorus. *Bracteæ* lanceolatæ, acuminatæ, rufescentes. *Flores* parvi, albi. *Sepala* lanceolato-oblonga, alba basi olivacea, lateralia paullo obliqua. *Petala* sepalo postico adnata, cum hoc æquilonga. *Labellum* sepalis brevius, lanceolatum, linguiforme, obtusum, incrassatum, album, in medio a pulvino pustuloso auctum; calcar elongatum, saccatum: glandulæ $\frac{1}{2}$ parti calcaris adnatæ, pedicellatæ, globosæ, flavæ. *Columna* brevis, crassa. *Anthera* ovata, rostrata; pollinia 2, elongata, pyriformia.

Hab. Singapore: Chan Chu Kang!

Sporadic in thick wet woods.

A very pretty little species, with deep reddish olive-leaves with three distinct pink stripes.

MACODES, Blume.

M. PETOLA, *Lindl., Gen. et Sp. Orch.*, p. 497; *Blume, Orch. Archip. Ind.*, p. 119, t. 31, f. 2.

Hab. Singapore: Selitar!
Selangor!
Johore: Gunong Panti!
Malacca: Mt. Ophir!

This is decidedly uncommon, though widely scattered throughout the peninsula. It is very seldom to be met with in flower. Blume's figure is a very good one of the peninsular plant; but he figures the bract as much shorter than the ovary, instead of being quite as long as it, as it is in our plant; and the pollinia I found in the Mount Ophir plant are longer and narrower, and have a longer pedicel and much smaller disc than those he figures.

CYSTORCHIS, Blume.

C. VARIEGATA, *Blume, Orch. Archip. Ind.*, p. 89, t. 24, f. 3.

Hab. Singapore: Chan Chu Kang, Bukit Mandai, &c.!
Johore: Gunong Panti!
Pahang: Tahan River Woods!
Perak: Batu Kuran, *Curtis!*
Kedah: Kedah Peak!

By no means a rare plant; growing in dense jungle, and often along paths therein. The leaves are pale apple-green reticulated with darker bars.

Var. PURPUREA, *Ridl.* *C. javanica*, Blume, l.c., p. 87; *Hetæria javanica*, Blume, Bijdr., p. 410.

Hab. Singapore: Choa Chu Kang!
Pahang: Tahan Woods, with the commoner variety!

I cannot make anything but a variety of this plant. The only differences that I can see lie in the deep purple colour of the leaf. The "crenate" rather undulate margin is by no means constant in the form.

I have kept the green form *C. variegata* as the type, as it is by far the commonest; and altered the varietal name to *purpurea* instead of using *javanica* because (both species being indigenous to Java) it has no distinctive meaning.

CYSTORCHIS APHYLLA, *Ridl.*, *sp. nova.* Herba 4-pollicaris, pallida, saprophytica, aphylla; vaginæ acuminatæ, superne rufescentes; radices paucæ, crassæ, fasciculatæ. *Flores* 3–4, parvi; ovaria $\frac{1}{4}$ poll. longa; bracteæ ovariis paullo breviores, lanceolatæ acuminatæ acutæ. *Sepala* $\frac{1}{4}$ poll. longa, lanceolata acuminata, basi connata gibbosa, flavescentia apice rufescentia. *Petala* sepalis breviora angustiora. *Labellum* lanceolatum, basi saccatum, apice obtusum; margines pro majore parte involuti. *Columna* subteres, superne incrassata. *Anthera* ovata; rostrum sursum curvum; caudiculus longiusculus, acutus; stelidia dentiformia, lata, divaricata; rostellum 0. Pollinia admodum fissilia; fasciculi lineares, in pedicellis elongatis planis cuneati. *Stigma* terminale.

Hab. Malacca: Dense jungle at Merlimau, fl. November!

A remarkable saprophytic species, in which the rostellum seems to be entirely suppressed, and the stigma upturned so that the pollen readily falls into it and fertilizes it. The lip has the shape of that of *C. variegata*, Blume; the base is excavate or depressed, the middle portion has the sides rolled in till they meet, but are open again at the apex. The thick rounded column may have been modified in the few flowers I have seen by fertilization. Although the plant is self-fertilized there is plenty of nectar in the spur of the lip. The pollen is very pulverulent, broken up into very narrow wedge-shaped pieces, which readily fall into the lip, and as there is no rostellum, into the stigma also. It is a rare plant and I have only met with a few specimens in fruit and one in flower.

ODONTOCHILUS, Blume.

O. MACRANTHUS, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 90, *et Ic. Pl.*, t. 2161.

Hab. Perak: Tea gardens, Maxwell's Hill, *Curtis!* &c.

Odontochilus calcaratus, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 99, *et Ic. Pl.*, t. 2162.

Hab. Perak: on a rock on the Hermitage Hill!

O. pectinatum, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 99, *et Ic. Pl.*, t. 2165.

Hab. Perak: on rocks on Maxwell's Hill near the top!

Rather a pretty plant, flowering in June. Leaves dark green, sepals and petals green, lip white.

O. brevistylis, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 100, *et Ic. Pl.*, t. 2166.

Hab. Perak: Gunong Batu Putih, *Wray.*

HÆMARIA, Lindl.

H. discolor, *Lindl.*, *Gen. et Sp. Orch.*, p. 490.

Hab. Johore: Pulau Tioman! Pulau Aor! Pulau Tinggi!
Penang: Penang Hill, *C. Curtis*!

Var. Ordiana, *var. nov.*, with the leaves bright velvety green, with pale veins, is obtained in Pulau Tinggi. It is very much rarer than the dark red form.

Var. Concolor, *var. nov.* Leaves deep olive green with pink midrib. I received this from Saigon from Dr. Bronsmiche.

Var. Otletæ, Ridl. *H. Otletæ*, Rolfe, in Illustr. Hortic., xxxviii. (1891) p. 31, t. 124, is a narrow-leaved form which sometimes appears with the commoner forms.

The well-known locality for this orchid is on the islands lying off the east coast of Johore. On the nearest, Pulau Tioman, I have found it growing on rocks in the streams. The natives, who deal in it and import it in large quantities, call it "*Daun Low*," *i.e.*, Sir Hugh Low's leaf.

The flowers, which are pure white, except for the conspicuous yellow anther-cap and apex of the column, are unusually showy for this section of *Neotteæ.* I have seen them fertilized by a butterfly, viz., *Plesioneura asmara.* This insect, which has very long legs, settled on the spreading sepals and lip, and plunged its proboscis into the opening of the spur between the lip and column, which are closely appressed together. While thus engaged one of its left legs struck against the viscid disc of the pollinia, which it withdrew, and which remained adhering to it. The column in this plant is so twisted to one side that an insect seeking honey in the spur could not, unless very large, touch the pollinia with its head. The stigma is a projecting cushion placed a little below the anther-cap. The butterfly, after sucking the nectar for some seconds, darted suddenly to another flower, and struck with its leg the stigma implanting the pollinia on it; but as it immediately flew off again a portion only of the pollen adhered to the stigma. I caught another specimen at the flowers which bore the pollen masses firmly attached to the right fore-foot.

Hæmaria seems to be specially adapted for butterfly-fertilization in several points. Unlike many *Neottieæ*, it inhabits sunny rocks near streams where butterflies are abundant. The flowers are showy and white, the colour of most of the butterfly-haunted flowers in the jungle; and the remarkable twist in the column and lip seem to be intended to ensure the visiting insect in striking the viscid disc and stigma with its legs.

DOSSINIA, Morren.

D. MARMORATA, *C. Morr. in Ann. Soc. Gand*, iv. (1848) p. 171, t. 195.

Hab. Penang: Government Hill, *C. Curtis!*

The only locality known outside Borneo.

ZEUXINE, Lindl.

Z. AFFINIS, *Benth. ex Hook. f., Fl. Brit. Ind.*, vi. p. 108.

Hab. Penang: *Maingay, Curtis!*

L. RENIFORMIS, *Hook. f., Fl. Brit. Ind.*, vi. p. 107, *et Ic. Pl.*, t. 2173.

Hab. Perak: *Scortechini.*

HYLOPHILA, Lindl.

H. MOLLIS, *Lindl., Gen. et Sp. Orch.*, p. 490, *et in Wall. List*, n. 7396.

Hab. Singapore: common; Chan Chu Kang! Choa Chu Kang! Toa Payoh! Tehan! Kranji!
Malacca: *Griffith.*
Perak: *Scortechini.*

This plant grows often in great abundance in wet swamps in thick jungle, usually with *Calanthe curculigoides*, Wall. It is a very sticky plant with green flowers.

HYLOPHILA LANCEOLATA, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 110.
Hab. Perak: *Scortechini.*

GOODYERA, R. Br.

G. GRACILIS, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 112.
Hab. Perak: Gunong Hijan, Thaiping Hills!

I have twice met with this little plant in the same spot, but it is not very common there. It grows on mossy banks on the highest part of the Gunong Hijan ridge. The leaves are very deep velvety green and waved along the edge; the flowers white and sweet-scented. The capsule is oblong elliptic $\frac{1}{4}$ inch in length. It flowers in June.

G. RUBENS, *Blume*, *Orch. Archip. Ind.*, p. 43, t. 9, fig. 1.
Hab. Perak: Batang Padang, *Wray.*

G. CORDATA, *Nichols.*, *Dict. Gard.*, ii. p. 81.
Georchis cordata, Lindl., Gen. et Sp. Orch., p. 496.
Hab. ? Perak: *Scortechini* (Hook. f., Fl. Brit. Ind., vi. p. 114).

HETÆRIA, Blume.

H. OBLIQUA, *Blume*, *Orch. Archip. Ind.*, p. 104, t. 34, fig. 1.
Hab. Singapore: Bukit Timah, in dense jungle, rare! Flowering in September.
Sungei Ujong: Bukit Danan!

This was described and figured by Blume from Lake Babay, in Borneo. The Singapore plant differs slightly in having a silver central bar on the leaf. The lip is full of nectar, and bears two pairs of small plates, each ending in a point in the sac.

It is called "*Poko Tumbah Utar*," and the leaves are used for poulticing sore legs by the natives.

H. ELATA, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 116, *et Ic. Pl.*, t. 2191.
Hab. Perak: Batang Padang, *Wray.*

HETÆRIA ELONGATA, *Lindl.*, *Gen. et Sp. Orch.*, p. 494, *et in Wall. List*, n. 7384.

Hab. "Malay Peninsula": *Finlayson* (Wall. List, l.c.).

This is perhaps from Cochin - China, where Finlayson collected. It seems never to have been collected by anyone else.

H. NITIDA, *Ridl.*, *sp. nova.* *Caulis* ultra $\frac{1}{4}$ poll. crassus, succulentus, ascendens, olivaceus; radices crassæ. *Folia* 3 poll. longa, $1\frac{1}{2}$ poll. lata, ovata, acuta, atro-viridia, nitida; petiolus $1\frac{1}{4}$ poll. longus, canaliculatus; vagina $\frac{1}{4}$ poll. longa, ore obliqua. *Scapus* 9 poll. longus, gracilis, erectus, pubescens; vaginæ plures, dissitæ; racemus plurimiflorus. *Flores* parvi, rhachidi appressi, resupinati. *Bracteæ* $\frac{1}{4}$ poll. longæ, lanceolatæ, acuminatæ, rubræ. *Ovarium* $\frac{1}{4}$ poll. longum, cylindricum, sessile, glanduloso-pubescens. *Sepala* $\frac{1}{16}$ poll. longa, oblongo-ovata, æqualia, haud gibbosa, rufescentia, extra pubescentia. *Petala* sepalis breviora tenuiora, spathulata, glabra, alba, basi libera. *Labellum* sepalis multo brevius, carnosum, flavum, columnæ adnatum, cymbiforme, basi saccatum a papillis parvis 2-seriatis ornatum, apice rostratum marginibus involutis. *Columna* brevis, superne incrassata; clinandrium parvum, profundum. *Anthera* ovata, acuminata, rufescens; loculi disjuncti; margines tenues, albi, basi divaricati. *Pollinia* 2, pyriformia; caudiculus 1, breviter linearis, cum disco lineari-oblongo æquilongus. *Rostelli* lobi 2, breviter lineares. *Stigma* latum, olivaceum; stelidia linearia, cum rostello æquilonga.

Hab. Penang: Pulau Butong! Balik Pulau! *C. Curtis.*

Near *H. micrantha*, Blume, but with spathulate not linear petals and with a very different lip. The leaves are deep green and polished. As is usual in the genus, the flowers are reversed, the small lip and lateral sepals being uppermost. The latter are of a dull red colour, and the pure white petals are the most conspicuous portion of the flower.

H. ALBA, *Ridl.*, *sp. nova.* Herba elata, ferme $2\frac{1}{4}$ pedalis; radices longæ, crassæ, lanuginosæ. *Folia* usque ad 4 poll. longa, $1\frac{3}{4}$ lata, plura, ovata vel ovato-acuminata, acuta, obliqua; petioli 1 poll. longi, graciles; vaginæ magnæ, superne ampliatæ. *Racemus* 10 poll. longus, pluriflorus; rhachis pubescens. *Flores* parvi, tenues, glabri, flavi. *Bracteæ* $\frac{1}{4}$ poll. longæ, lanceolatæ,

acuminatæ. *Ovarium* $\frac{3}{4}$ poll. longum, cylindricum, sessile, pubescens. *Sepala* lanceolata, obtusa, glabra. *Petala* sepalis tenuiora, cum his æquilonga. *Labellum* petalis paullo brevius, membranaceum, basi cymbiforme saccatum a callis 2 brevibus linearibus ornatum, imâ basi columnæ adnatum; lamina lanceolata, marginibus involutis. *Columna* brevis. *Anthera* rostello longior, lanceolato-linearis; stelidia magna, oblique cuneato-oblonga. *Rostellum* brevius; lobi lanceolato-lineares, apice incurvi. *Capsula* $\frac{1}{2}$ poll. longa, ellipsoidea.

Hab. Perak: on a bank by the road, Hermitage Hill, Kwala Kangsa Valley; a single plant (descr. ex sicco)!

The only specimen I have seen was nearly out of flower, and the pollen had all gone. It is a tall plant of the habit of *Goodyera rubens*, Blume, and differs from other Hetærias in the short bracts, thin textured glabrous perianth. The lip and petal contain many bundles of rhaphides. The anther is remarkably long and narrow. The stelidia very large, flattened and enlarged upwards; the rostellar lobes are quite short.

LEPIDOGYNE, Blume.

L. LONGIFOLIA, *Blume, Orch. Archip. Ind.*, p. 94, t. 25.

This rare plant has been re-discovered by Mr. Hullett in the Island of Lingga, on the mountain called Gunong Dai, and by Mr. Curtis in Penang. Blume collected it on Mt. Salak, in Java.

APHYLLORCHIS, Blume.

A. PALLIDA, *Blume, Bijdr.*, t. 77; *Mus. Bot. Lugd. Bat.*, i. p. 30, *et Orch. Archip. Ind.*, p. 52, t. 13.

Hab. Singapore: Tanglin! Reservoir Woods!
Pahang: Tahan Woods!
Perak: *Scortechini*, &c.

All the plants which I have seen were of a pale straw colour with pink dots. It is a very difficult plant to find, owing to its very inconspicuous colouring. In Singapore and Pahang it grows in dry woods, among dead leaves.

ANŒCTOCHILUS, Blume.

A. Reinwardtii, *Blume, Orch. Archip. Ind.*, p. 48, t. 12, fig. 2.

Hab. Perak: Maxwell's Hill!
Kedah: Kedah Peak!

Not as common as the next.

A. geniculata, *Ridl., sp. nova.* *Caulis* repens. *Folia* 2–3, 1–2 poll. longa, 1½ poll. lata, ovata, acuta vel subacuta, velutina, brunea aureo-reticulata; petioli breves. *Racemus* 3 poll. longus, pauciflorus, pubescens, olivaceus; vaginæ ½ poll. longæ, acuminatæ. *Bracteæ* ½ poll. longæ, ovariis breviores, lanceolatæ acuminatæ, pubescentes, rufescentes. *Sepalum* posticum lanceolatum acutum rufescens petalis albis pellucidis adnatum, lateralia patenti-deflexa basi gibbosa rufa pubescentia. *Labellum* album; basis angusta, columnæ parallela, tunc abrupte geniculata deflexa; maculæ 2, rufæ, sub geniculo sitæ; fimbriæ usque ad 18, longæ; lobi obcuneati, erecti, truncati; labelli apex acutus, dentiformis, deflexus. *Calcar* ¾ poll. longum, sepalis longius, curvum, obtusum, latum, lateraliter compressum, basi a glandulis 2 ovoideis papillosis ornatum. *Columna* brevis, lata. *Anthera* elongata acuminata, rufescens. *Pollinia* clavata, incurva; caudiculus linearis, planus, in dorso canaliculatus; discus cuneatus, acutus. *Stelidia* falcata, decurva. *Rostellum* loratum, bifidum. *Stigmata* lateralia, rotundata.

Hab. Singapore: Toas! Chan Chu Kang! and other wooded districts.
Johore: Gunong Panti!
Penang: West Hill, *Curtis.*
Malacca: Mt. Ophir.

This species differs from the last chiefly in the form of the lip. In habit and colouring of leaf it seems indistinguishable. The claw of the lip runs at first parallel to the erect column, then is abruptly bent downwards, and then again at right angles to the base. On this portion only are borne the white processes, about nine on each side, sometimes branched. The terminal lobes are rather narrower than in *A. Reinwardtii*, Blume, and are curvate, enlarged at the apex, and the point of the lip is tooth-like and abruptly deflexed. The knee of the claw is polished white, except for two red spots just below the

bend. The spur is considerably longer than the deflexed sepals, curved, broad, and laterally flattened. The anther is very much longer than in *A. Reinwardtii*, and consequently the pedicel of the pollen masses is also elongate. The *Anœctochili* frequent the densest jungles, where they grow among dead leaves, among which their brown foliage is not at all conspicuous. The natives call them in Malacca "*Bunga Tulis*," lit., Written flowers—the reticulations on the leaf being supposed to resemble writing.

CRYPTOSTYLIS, R. Br.

C. ARACHNITES, *Blume, Orch. Archip. Ind.*, 133, t. 45, f. 2.

There are two very distinct looking forms of this plant which will probably eventually be shown to be specifically distinct. One has a very broad, pale lip with darker spots, evidently typical *C. Arachnites*. I have collected it on Maxwell's Hill, in Perak.

The other, which is commoner, has a narrower dark brown lip, and is perhaps *C. filiformis*, Blume, though it differs from the figure and description in having mottled leaves, and sometimes a very tall, slender raceme considerably over a foot in length. I have this from Merlimau, in Malacca; Government Hill, Penang; Bukit Hitam, in Selangor (coll. *H. Kelsall*); Kedah Peak; and Bukit Timah, in Singapore.

Cryptostylis inhabits banks, usually at considerable elevations (from 2–5,000 feet), the Malacca and Singapore localities being the only low-country spots whence I have seen it. It is called "*Bunga Bangkong*" in Malacca.

CORYSANTHES, R. Br.

C. PICTA, *Lindl., Gen. et Sp. Orch.*, p. 394.

Hab. Kedah Peak: alt., 4,000.
Perak: Tambak Batak, *Scortechini.*

Scortechini's drawing seems more to resemble *C. mucronata*, Blume. The Kedah Peak plant, too, does not altogether resemble Blume's figure, in which the leaves, which are much larger, are veined with purple instead of white, and the flower is violet with dark sepals and petals, while the Kedah plant had white sepals and petals and a deep maroon lip. It grew abundantly, deep in moss, but seems to flower rarely. The remarkable growth of the pedicel just as the fruit is ripening I have alluded to under *Didymoplexis.*

I have seen this or the next species out of flower on Mt. Ophir and Bukit Hitam, in Selangor.

CORYSANTHES FORNICATA, *Lindl., Gen. et Sp. Orch.*, p. 394.
Hab. Perak: Tambak Batak; Gunong Euar, *Scortechini.*

POGONIA, Juss.

P. PUNCTATA, *Blume, Mus. Bot. Lugd. Bat.*, i. p. 32, *et Orch. Archip. Ind.*, p. 150, t. 49, f. 2.
Hab. Singapore: Bukit Timah!
Lankawi Islands: Terutau, *C. Curtis!*

This grows in very wet spots in the jungle on Bukit Timah. It is not recorded from the Malay Peninsula in the 'Flora of British India.'

P. FLABELLIFORMIS, *Lindl. in Wall. List*, n. 7400.
Hab. Pahang: Kwala Tembeling Woods?
Perak: damp grassy fields, Padang Rengas!

I am doubtful as to the leaf specimens from the Pahang locality, but I have little doubt as to the flowering ones from Perak.

P.? STRIATA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 377.
Hab. Pahang: Tahan River Woods!

DIDYMOPLEXIS, Griff.

D. PALLENS, *Griff. in Calc. Journ. Nat. Hist.*, iv. (1844) p. 383, t. 17.
Hab. Singapore: Chan Chu Kang! Bajan!
Johore: Gunong Panti!
Perak: *Scortechini.*
Kedah: Kedah Peak!

A very succulent, fragile plant, very inconspicuous when in flower. It grows usually in dry woods. The remarkable lengthening of the pedicel of the flower after fertilization has been described and figured by Hemsley in 'Journ. Linn. Soc. (Bot.)' xx. (1883) p. 311, t. 28. The object of it is, as Hemsley suggests, to carry the fruit above the decaying vegetation. The plant is so deeply buried in the ground, as is often the case with small saprophytes, that the seeds would be scattered when ripe close to the plant, whereas, by the rapid growth of the pedicel, they are carried up so far that when the capsule splits the breezes sweeping through the forest can drift the seeds far away. The same thing occurs in *Corysanthes*, which is a very small plant often deeply imbedded in moss. As the fruit ripens the pedicel rather rapidly elongates about an inch and a half; and then, and not till then, the capsule bursts, and the seeds are borne away by the wind.

LECANORCHIS, Blume.

L. MALACCENSIS, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 377, t. 65.

Hab. Singapore: Bukit Timah! Bajan!
Johore: Gunong Panti! Bukit Tenabang, *Kelsall.*
Malacca: Bukit Sadanen! Mt. Ophir!
Pahang: Tahan Woods!
Kedah: Kedah Peak!

By no means a rare plant, but, owing to the slenderness of its black stems, it is very inconspicuous.

GASTRODIA, R. Br.

G. JAVANICA, *Lindl., Gen. et Sp. Orch.*, p. 384; *Blume, Orch. Archip. Ind.*, p. 145, t. 52, f. 1.

Hab. Singapore: very rare. On an old fallen tree at Chan Chu Kang! And also at Bukit Mandai!

The lip in the Singapore plant is less distinctly lobed, broader and blunter than in Blume's figure. The capsule is fusiform at first, becoming nearly globose as it splits. As is usual in these plants, the separate carpels split for the whole length except at the top and bottom.

G.? HASSELTII, *Blume, Mus. Bot. Lugd. Bat.*, ii. 175.

Hab. Perak: Ic. *Scortechini.*

The drawing may represent this species of Blume's. It is certainly distinct from the preceding.

TRIBE *OPHRYDEÆ.*

HABENARIA, Willd.

H. Lindleyana, *Steud. Nom.*, ed. II. i. p. 717.
Hab. "Malay Peninsula": Ic. *Finlayson* (in Herb. Kew.).
Probably from Siam.

H. Murtoni, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 144.
Hab. Perak: limestone rocks, *Scortechini*, &c.
Gunong Poudok: *Murton* (in Herb. Kew.).

H. Kingii, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 144.
Hab. Perak: limestone rocks (*King's Collector*).

H. singapurensis, *Ridl.*, *sp. nova.* *Caulis* 3-pedalis, erectus, teres, purpurascens, inferne vaginatus, superne foliatus. Folia c. 12, 6 poll. longa, 4 poll. lata, lanceolata, acuminata, atro-viridia, subpetiolata; vaginæ 1 poll. longæ, ore obliquæ; caulis supra folia glaucescens, a bracteis lanceolatis acuminatis tectus. *Racemus* densus plurimiflorus; flores pro genere mediocres. *Bracteæ* $\frac{3}{4}$ poll. longæ, lanceolatæ acuminatæ, glaucæ. *Pedicelli* $\frac{1}{2}$ poll. longi, glaucescentes; ovarium $\frac{1}{2}$ poll. longum. *Sepalum* posticum $\frac{3}{8}$ poll. longum, lanceolato-oblongum, cymbiforme a mucrone $\frac{1}{8}$ poll. longo capillari pallide glauco-viridi terminatum, lateralia $\frac{3}{8}$ poll. longa $\frac{3}{16}$ poll. lata oblonga obtusa obliqua alba viridi-3-nervia a mucrone $\frac{1}{4}$ poll. longo capillari terminata. *Petala* bifida; lobus posticus $\frac{3}{8}$ poll. longus linearis recurvus olivaceo-prasinus, anticus multo minor linearis deflexus. *Labellum* ferme ad basin 3-fidum; lobi lineares, laterales $\frac{3}{8}$ poll. longi obtusi glauci olivaceo-virides patentes lobo centrali paullo breviores. *Calcar* $\frac{3}{4}$ poll. longum, cylindricum, gracile, porrectum. *Columna* $\frac{1}{4}$ poll. longa, in dorso rotundata rufa. *Anthera* flavescens, processubus longis rectis. *Pollinia* pyriformia, flavidula, granulis parvis; caudiculi longi, capillares superne dilatati aurei; discus ovalis, ater. *Stelidia* cum $\frac{1}{2}$ parte columnæ æquilonga, oblonga, truncata, albescentia. *Stigmata* majuscula, oblonga, truncata, decurva. *Rostellum* triangulare, erectum, rufescens.

Hab. Singapore: very rare. A single plant in the woods at Choa Chu Kang, in a thick wet spot! (August, 1894.)

This species is near *H. salaccensis*, Blume, of Java, but is very distinct in the dense thick raceme of pale whitish flowers. The dorsal sepal is much narrower, of a glaucous greyish green, minutely punctate. It has a slender hair-like awn at the apex. The lateral sepals are white with three green veins, the awn much longer. The petals much resemble those of *H. salaccensis*, but the lip is longer in proportion to the sepals; the lobes very narrow, of a dull glaucous olive-green. The spur is long and straight. The stigmatic lobes are much shorter than in the other species, and the anther processes much longer. The pollen granules are very fine, the pedicel of a clear translucent golden colour, very slender.

Though by no means a showy plant, this has a pleasing appearance; the peculiar greyish-green colour mixed with the white of the sepals being rather striking.

HABENARIA XANTHOCHILA, *Ridl., sp. nova.* *Tubera* 1 poll. longa, oblonga. *Caulis* pedalis. *Folia* usque ad 6 poll. longa, 1¼ poll. lata, lanceolata acuminata, inæqualia, basi caulis congesta, reticulata; folia caulina plura, vaginantia, lanceolata acuminata. *Racemus* laxus, c. 10-florus. *Flores* magni, speciosi. *Bracteæ* 1 poll. longæ, cum ½ parte ovarii æquilongæ, acuminatæ acutæ, ovaria involventes. *Sepalum* posticum cum petalis galeam formans, ovatum, subobtusum, carinatum, viride, lateralia ovato-oblonga decurva torta. *Petala* spathulata, oblonga, falcata, viridia. *Labellum* 1½ poll. longum, trilobum, vitellinum; lobi laterales oblongi spathulati falcati apice dilatati truncati, medius basi auguste obovatus apice a lobis parallelis bifidus; calcar 2 poll. longum deflexum, subteres, apice minute uncatum. *Anthera* galeata, curva, olivacea, brachiis latis porrectis. *Pollinia* granulosa, fusiformia, curva; caudiculi longissimi, capillares, basi late triangulares; discus parvus, oblongus, ruber. *Rostellum* magnum, ovatum. *Stigmata* brevia, decurva; glandulæ laterales ovoideæ.

Hab. Penang: *C. Curtis!*

A very rare and beautiful plant, allied to *H. militaris*, Reichb. f., of Cochin-China, but with the lip of a beautiful bright yellow.

H. ZOSTEROSTYLOIDES, *Hook. f., Fl. Brit. Ind.*, vi. p. 155.

Hab. Malacca: Mt. Ophir range, on Gunong Mering!
Perak: *Scortechini, Wray!*

This grows in moss, often plentifully, on Mt. Ophir; but it is difficult to get good specimens, as the flowers are constantly devoured by caterpillars. The foliage is certainly very similar to that of *Cryptostylis*, having even the darker blotching of that plant. The flowers are green.

HABENARIA GIGAS, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 160.
Hab. Perak: Batang Padang, *Wray.*

H. CARNEA, *N. E. Br. in Gard. Chron.* (1891) II. p. 729, fig. 105; (1892) II. p. 300.
Hab. Lankawi Island, *C. Curtis.*

There are two forms of this; the typical one with pale rose or white tinted with rose flowers, several on the raceme, and brown leaves with silver spots, and—

Var. CONCOLOR, *var. nov.*

Leaves entirely green. Raceme 1–2-flowered. Flowers smaller, pure white.

This I have received from native dealers, who say that they got it in Tonka.

H. GLAUCESCENS, *Ridl.*, *sp. nova.* Herba 2-pedalis. *Tuber* 2 poll. longum, ½ poll. crassum, oblongum; radices crassæ lanuginosæ. *Folia* 3, in caulis medio sita, inæqualia, usque ad 5 poll. longa, 2 poll. lata, ovata, acuta, in margine undulata, 9-nervia, subtus glaucescentia crasse carinata, superne atroviridia. *Caulis* pars supra folia 5 poll. longa, teres, præter bracteas parvas elongato-lanceolatas nuda. *Racemus* 8 poll. longus, validus; flores copiosi, subsecundi; rhachis sulcata. *Bracteæ* ½ poll. longæ, cum ovariis æquilongæ, lanceolatæ, acuminatæ, glauco-virides. *Flores* aperti, pro genere majusculi, virides. *Sepala* ¼ poll. longa, anguste linearia, patentia, viridia mox rubescentia, pubescentia. *Petala* sepalis breviora latiora crassiora, lanceolata, integra, olivaceo-viridia. *Labellum* cum petalis æquilongum, æqualiter 3-lobum, sub columnâ saccatum; lobi lanceolati, obtusi; calcar brevius, scrotiforme. *Anthera* parva, apice obtusa, viridis; loculi paralleli; processus 0. *Pollinia* ovata, clavata, citrina; caudiculi breves; disci minimi. *Rostellum* breve, latum, apice obtusum, haud productum. *Stigmatis* processus laterales erecti, clavati, antherâ vix breviores.

Hab. Lankawi Isles: brought by a native from somewhere near Lankawi, *C. Curtis* (April, 1894)!

A tall stout plant, with the leaves nearly 6 inches above the base of the stem, of a rich dark green above, glaucous beneath. Raceme of many fleshy flowers; rhachis and bracts sea-green. Sepals narrow, linear, pubescent, at first olive-green, soon becoming reddish. Petals and lip lobes equal and similar spreading-recurved, dull greyish olive-green. The lip is dilate at the base just above the entrance to the short spur.

Its affinity is with *H. goodyeroides*, D. Don.

HABENARIA LACERTIFERA, *Benth.*, *Fl. Hongk.*, p. 362.

Hab. Singapore: Selitar! Jurong! Pasir Panjang! Blakang Mati! Bukit Timah! &c.
Malacca: Sungei Hudang! Bukit Bruang!
Penang: Government Hill.

Mr. Hullett found it also very abundant on Gunong Dai, in the islands of Lingga.

It grows along paths and roadsides in open country, but seems never to be very abundant in Singapore. The flowers are pure white, and sweetly scented.

The var. *robustior*, Kraenzl. in Engl. Jahrb., xvi. (1892) p. 160 (var. *robusta*, Hook. f., Fl. Brit. Ind., vi. p. 163), is merely a strongly grown plant in richer soil.

The lip has usually three short equal lobes, but I have met with a form (at Jurong, Singapore) in which the two lateral lobes were prolonged into slender linear processes, much longer than the median one. This is given as part of the character of *robustior*, but the specimens were not bigger than the ordinary form. They were also remarkable for apparently having no spur to the lip; but I found that the spurs all withered and fell off shortly after the flowers opened.

H. MONTICOLA, *Ridl.*, *sp. nova.* *Tubera* ½ poll. longa, oblonga. *Folia* 3–4 basalia, 1 poll. longa, ½ poll. lata, lanceolata, acuta, atroviridia. *Caulis* 7–18 poll. longus, gracillimus, præter bracteas lanceolatas acuminatas basin versus sitas nudus. *Racemus* laxus, multiflorus. *Flores* perparvi, virides. *Bracteæ* ⅛ poll. longæ, lanceolatæ acutæ; pedicelli bracteis vix longiores. *Sepala* $\frac{1}{16}$ poll. longa, oblongo-ovata. *Petala* sepalis paullo breviora, elliptico-oblonga, obtusa, integra. *Labellum* 3-fidum; unguis brevis; lobi laterales ¼ poll. longi filiformes, medius multo brevior obtusus; calcar cum sepalis æquilongum, rectum, bifidum. *Anthera* brevis, in dorso carinata, apice truncata; rostellum longiusculum.

Hab. Malacca: Mt. Ophir, alt. 3,000 feet !
Kedah: Kedah Peak, 3,000 feet !

This is a very slender small-flowered species, growing among moss in streams on these two mountains, and apparently rarely flowering, as I only met with a couple of plants in flower in each locality. It is allied to *H. lacertifera*, Benth., and *H. tentaculata*, Reichb. f.; but the flowers are very much smaller, the bracts narrower, and the short spur is distinctly bilobed at the apex.

CYPRIPEDIUM, Linn.

C. NIVEUM, *Reichb. f. in Gard. Chron.* (1869) p. 1038.

Hab. Lankawi Islands, *Curtis*, &c.

It is remarkable that the only other locality known for this species is the Tembilan Islands, near Borneo.

C. BARBATUM, *Lindl., Bot. Reg.* (1841) *Misc.*, p. 53.

Hab. Johore: Gunong Panti, a single plant in dense jungle !
Malacca: Mt. Ophir, abundant ! Remban Hills !
Penang: Government Hill, abundant !
Kedah: Kedah Peak !

This well known species is often most abundant, sometimes covering rocks in masses, as on Penang Hill. On Mt. Ophir and Kedah Peak, though plentiful, it is more scattered, growing in moss by the stream in exposed places. Nearly all the named cultural varieties grow together. *C. superbiens*, Reichb. f. in Bonplandia, iii. (1855) p. 227, I am quite unable to distinguish specifically; it seems to be merely a fine form, and said to have been obtained on Mt. Ophir; it is commonly called "*Bunga Kasut*" (Shoe flower) by the Malacca natives.

I have found a few plants of a *Cypripedium* on the sea-shore, growing in sand beneath *Pandani*, in Johore, but the plant never flowered. It resembles a dwarf *C. barbatum*, but the leaves are much less distinctly marbled. It may prove a new species.

Just outside the boundary, in Siam, grow *C. insigne*, var. *Exul*, Ridl. in Gard. Chron. (1891) II. p. 92 (*C. Exul*, Hort., O'Brien, in Gard. Chron. (1892) II. p. 522), and *C. bellatulum*, Reichb. f. in Gard. Chron. (1888) I. p. 648, and its variety *Godefroyæ*.

APOSTASIACEÆ.

APOSTASIA, Blume.

A. NUDA, *R. Br. in Wall. Pl. As. Rar.*, i. p. 76, t. 85.

Hab. Singapore: Bukit Timah, Jurong, Changi, &c.; very common in dry woods!
Johore: Bukit Murdom, Johore Bahru!
Malacca: Mt. Ophir, Merlimau, Selandor!
Penang: Government Hill!
Perak: *Wray*; Dindings!
Kedah: Kedah Peak!

I have also collected it on the Carimon Islands, south of Singapore.

A very abundant plant, called by the natives "*Pulampas Budak*" and "*Kinching Pelandok*" (Mousedeer's urine) and "*San Juan Hutan*" (San Juan being a Portuguese name for *Dianella*, has been adopted by the Malays with the addition of *Hutan*, *i.e.*, wood, for this plant). It is used for several complaints, including hydrophobia.

The flowers are coloured yellow in Wallich's Plantæ Asiaticæ Rariores, l.c.; but, out of the numerous specimens I have seen, I have only found one with yellow or yellowish flowers, viz., on Mt. Ophir. The petals and sepals were, with this exception, white. It varies very much in the development of the panicle, which is sometimes very large, though short.

A. WALLICHII, *R. Br. in Wall. Pl. As. Rar.*, p. 75, t. 84.

Hab. Johore: Gunong Panti!
Pahang: Tahan River Woods, &c.!
Penang: *Curtis.*
Perak: *Scortechini*, &c.

Much less common than the preceding. Flowers white whenever I have seen them.

A. LATIFOLIA, *Rolfe, in Journ. Linn. Soc.* (*Bot.*), xxv. (1889) p. 242.

Hab. Malacca: Mt. Ophir!
Perak: *Scortechini.*

A much rarer plant than the other two.

NEUWIEDIA, Blume.

N. Lindleyi, *Rolfe, in Journ. Linn. Soc. (Bot.)*, xxv. (1889) p. 232, t. 118, f. 10–12.

Hab. Singapore: not very rare !
Malacca: Ayer Panas ! Chaban ! Sungei Udang, Bukit Sintang !
Sungei Ujong !
Penang: Government Hill !

This has beautiful bright yellow flowers. The fruit is capsular. It frequents damp jungle, and is called "*Jamba*" by the natives.

N. Curtisii, *Rolfe, in Journ. Linn. Soc. (Bot.)*, xxv. (1889) p. 233.

Tupistra singapureana, Wall. List, n. 5195; Baker, in Journ. Linn. Soc. (Bot.), xiv. (1875) p. 581; Hook. f., Fl. Brit. Ind. vi. p. 325.

Hab. Singapore: Changi !
Johore: Gunong Panti !
Penang: Government Hill !

In flower this resembles the last; but the fruit, instead of being a trigonous green capsule, is a succulent scarlet berry looking at first sight like the fruit of a *Dracæna*. Wallich's type of *Tupistra singapureana* is a specimen of this plant in fruit, from Singapore.

N. Griffithii, *Reichb. f., Xenia Orch.*, ii. p. 215.

Hab. Singapore: Bukit Timah ! Bukit Mandai ! Sungei Morai ! Chua Chu Kang !
Malacca: *Griffith.*
Perak: (*King's Collector.*)

This is a very local plant, growing in damp spots, sometimes even in streams, with *Pandani*, &c. The stem is much longer than that of the other two species, and it has more of a tendency to creep. The flowers are white, tipped with green. The fruit resembles that of *N. Lindleyi*, Rolfe, being capsular.

A New Species of Conifer, *Pinites Ruffordi*, from the English Wealden Formation. By A. C. SEWARD, M.A., F.G.S. (Communicated by Prof. REYNOLDS GREEN, D.Sc., F.R.S., F.L.S.)

[Read 21st November, 1895.]

AMONG fossil plants there are perhaps none which are more unsatisfactory, from the point of view of generic and specific determination, than the structureless casts or impressions of coniferous twigs. On the other hand, the frequent occurrence of well-preserved wood in Palæozoic, Mesozoic, and Cainozoic strata, has led to detailed comparative investigations on the histological structure of fossil and recent *Coniferæ*, and it has been found possible to make use of certain anatomical characters as fairly trustworthy guides in generic identification.

The genus *Pinites*, first used by Witham, Göppert, and other early writers, has been adopted by many palæobotanists as a convenient designation for fossil stems, foliage, and cones, exhibiting such characters as agree fairly closely with those of recent Pines. Used in its wider sense, *Pinites* serves as a representative genus for fossil *Abietineæ*. The question of nomenclature is often one of some difficulty in dealing with fragments of fossil plants. The same term has been employed by various writers in a different sense, and no little confusion has been caused by this inconvenient, though not altogether unnecessary practice. In Brongniart's 'Prodrome,'* we find the terms *Pinus* and *Abies* applied to fossil conifers which are regarded as closely allied to existing species of these genera; but in a later work † by the same author, Göppert's example is followed, and the generic term *Pinites* is used in a wide sense, including other genera of the *Abietineæ* in addition to *Pinus*.

Endlicher, in his 'Synopsis Coniferarum,' ‡ confines the generic name *Pinites* to cones and leaves, and makes use of the genus *Peuce* for specimens of fossil wood; Brongniart accepts this application of the two genera. Göppert § prefers to extend the meaning of *Pinites*, and includes under that name leaves, cones, and fossil wood, possessing such characters as are found in *Pinus*, *Abies*, *Larix*, and other members of the *Abietineæ*. More recently, Kraus proposed the name *Pityoxylon* for fossil wood with the following type and structure:—"Lignum stratis concentricis angustis latioribusque, cellulis prosenchymatosis porosis, poris magnis, rotundis, uni vel pluriserialibus, oppositis; cellulis ductibusque resiniferis haud raris; radiis medullaribus compositis ductumque resiniferum includentibus vel simplicibus, cellulæ eorum haud raro biformes."* The custom of employing a special terminology for mineralized fossil wood has been followed by several writers, and has much to recommend it.

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* 'Prodrome Hist. Vég. Foss.,' p. 107.

† 'Tableau,' p. 67.

‡ Pp. 283 and 291.

§ 'Monograph. Foss. Conif.,' p. 211.

The specimen described in the present communication may possibly be generically identical with the recent *Pinus*, but having only a fragment of wood before us, and no evidence as to the leaves or cones, it would be unwise to adopt the name *Pinus* in the restricted sense of the existing genus. Probably the most convenient course to follow is to make use of the fairly comprehensive genus *Pinites*, with the addition of Kraus's term *Pityoxylon*.

In the recent genus *Pinus*, the horizontal tracheids accompanying the medullary rays, with their characteristic irregular ingrowths, afford a distinguishing feature; † these have not been detected in the present species. Other characters, associated with the existing representatives of the genus, such as the arrangement of the bordered pits, the vertical and horizontal resin ducts, and the distinctly marked rings of growth, are clearly seen in the Wealden fossil.

The oldest species of fossil wood hitherto described to which the genus *Pinites* may reasonably be applied, is that described by Göppert and Stenzel from the Coal-Measures of Waldenburg, in Silesia, under the name of *P. Conwentzianus*.‡ Schenk § includes this species in Kraus's genus *Pityoxylon*. It is interesting to note, as Conwentz has pointed out, that bordered pits occur in considerable numbers on the tangential walls of the tracheids of this species; if the interpretation of the sections is correct, this character constitutes a striking peculiarity in the structure of *Pinites Conwentzianus.* Passing to Jurassic and Lower Cretaceous strata, we find *Pinites* well represented; from the Rhætic beds of Sweden, Nathorst * has described some structureless specimens of the genus, and a species of *Pityoxylon* is recorded from the Trias of Germany. In a recent monograph on fossil wood from the Holma Sandstone of Sweden, Conwentz describes some fairly well-preserved specimens of wood referred to the genus *Pinites.* Although coniferous wood is by no means rare in Upper Jurassic and Lower Cretaceous rocks, it is seldom that we find specimens with the minute structure clearly preserved. Mantell, Carruthers, Gardner, and others, have recorded several examples of cones from Wealden beds as species of *Pinites;* and more recently another species has been discovered in the Wealden rocks near Hastings, which shows cones and leaf-bearing branches in organic connection.† The fossil wood of the so-called "Pine raft" of Brook Point, in the Isle of Wight, has long been known to geologists; but, as a rule, the specimens from this locality do not admit of any accurate diagnosis by means of microscopical examination. In Dixon's 'Geology of Sussex,' Carruthers ‡ speaks of certain specimens of Wealden fossil wood as possessing a structure similar to that of recent species of the genus *Pinus.* In the 'Geological Magazine' for 1872, p. 10, the same author figures two sections of a piece of "Pine wood" from the Wealden of the Isle of Wight. An examination of the specimens now in the British Museum leads me to regard Carruthers's plant as a distinct species.

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* Schimper, 'Trait. Pal. Vég.,' vol. ii. p. 377.

† Möller, N. J. C. 'Erläut. Text—Atlas der Holzstructur,' 1888, p. 51.

‡ Göppert and Stenzel, "Nachträge zur Kenntniss der Coniferenhölzer der Palæozoischen Formationen" (in 'Abhand. K. Preuss. Akad. Wiss.,' Berlin, 1887), p. 54, pls. 11, 12.

§ 'Zittel's Handbuch,' vol. ii. p. 876. Solms-Laubach ('Fossil Botany,' p. 83) regards this species as a doubtful example of *Pinites*.

As a specific designation for the fossil wood described below, I have ventured to make use of Mr. Rufford's name; it is to him we are indebted for the type specimen, and for the large and valuable collection of Wealden plants recently acquired by the British Museum. The material obtained by Mr. Rufford from Ecclesbourne, Fairlight, and other localities in the neighbourhood of Hastings, has enabled us to considerably extend our knowledge of the Wealden flora. In the variety and number of its species, the flora of this epoch seems to have been almost equal to that of which so many specimens have been obtained from the older Jurassic beds of the Yorkshire coast and other districts.

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* Bidr. Sveriges foss. flora, in Svensk. Vet.-Akad Handl., vol. xiv., n. 3 (1876) p. 62-64.

† Wealden Flora (vol. ii., p. 196), Brit. Mus. Cat., 1895.

‡ 'Geol. Sussex,' edit. II. p. 279.

There is abundant evidence that in Lower Cretaceous and Upper Jurassic times *Pinites* was widely distributed; species have been recorded from England, France, Germany, Austria, Russia, Portugal, Belgium, Greenland, Spitzbergen, North America, Japan, and other parts of the world.

PINITES (§ PITYOXYLON) RUFFORDI, Seward, Cat. Mesozoic Pl. Brit. Mus. (Wealden Fl.), part II. p. 199, absque descriptione. *Pinites* ligni stratis concentricis distinctis, tracheidis punctatis, punctis rotundis discretis in unâ serie vel in duâbus seriebus in eodem plano horizontali juxtapositis, ductis resiniferis copiosis; radii medullares uni- vel multiseriales e cellulis parenchymatosis formati; cellulæ parenchymatosæ porosæ in medio radiorum multiseriatium ductum resiniferum solitarium includentes.

Annual rings well marked. Resin ducts numerous, occurring in regular rows in the spring and summer (autumn) wood, and scattered irregularly throughout the xylem tissue. Bordered pits on the radial, and rarely on the tangential walls of the tracheids, in single or double rows; when in a double row the pits of the two rows are opposite; the pairs of pits being on the same horizontal line. Medullary rays numerous, consisting of one row or more than thirty rows of cells, as seen in tangential section; the radial walls possessing simple oval or circular pits. In most cases the medullary rays are made up of a single vertical row of cells, but broader rays of more than one tier are fairly abundant, and often contain horizontal resin passages. Xylem parenchyma surrounds the resin ducts, and frequently the cavity of the ducts is occupied by large rounded cells, which appear to have grown like tüllen into the resin passage.

Type Specimen in the British Museum (*V.* 2304).

In a transverse section* 2·7 cm. in length, there occur 18 well marked "annual" rings, which show a striking irregularity in their relative breadth. The width of the broadest zone being about 3 mm., and of the narrowest 1 mm.; between these extremes the breadth varies considerably. In some parts of the section one finds two rings of narrower tracheids separated by seven or eight wider tracheids, one of the rings being a typical annual zone of summer wood, and the other consisting of fewer narrow elements, and occasionally incomplete. Such appearances may probably be referred to local changes in growth or in the supply of nutrition, and, when the two zones of narrow tracheids are complete, we may regard them as an example of two rings of growth formed in one year. In fig. 1 a transverse section is somewhat diagrammatically represented about three times the natural size. On the left-hand side of ring 1 (on the left-hand side of the figure), and separated from it by six to ten tracheids, there is a second narrower zone of smaller tracheids; similarly, close to ring 2, a second zone of narrower elements occurs; both these may be described as double rings. Instances of "double rings of growth" have been recorded by Kny, Strasburger* and other writers in recent trees. Another striking feature presented by a transverse section, is the abundance of resin ducts; on the right of ring 4 we find a row of numerous and crowded canals and on the right hand side of these, the diameter of the tracheids next to the duct is about the same as that of the summer tracheids. Again, in the summer wood of ring 6, there are a fairly large number of canals, also between rings 10

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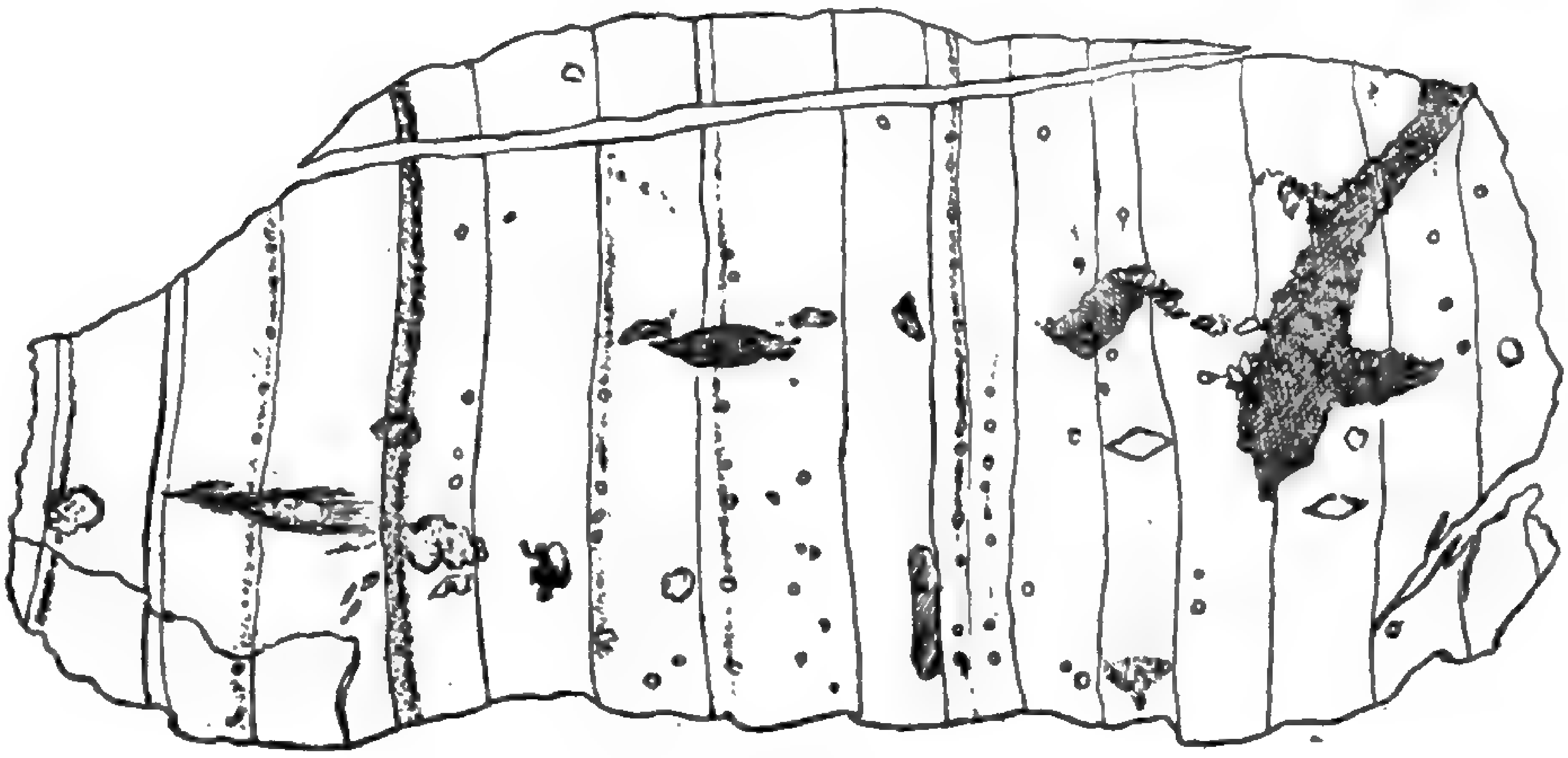
* The specimen on which the species, *Pinites Ruffordi*, is founded is probably a portion of a stem. Dr. Conwentz, to whom I showed the sections during his recent visit to England, expressed this opinion after a hurried microscopical examination.

FIG. 1.



Transverse section of the wood of *Pinites Ruffordi*, showing annual rings, resin ducts, &c. (× 3).

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* Strasburger, 'Histologische Beiträge,' Heft iii. 1891, p. 25.

and 11. Between rings 10 and 11 there occur only about 15 tracheids; between rings 12 and 13 as many as 40 or 50 tracheids.

The numerous dark patches scattered throughout the section represent disorganised groups of woody tissue; it is, however, not an easy matter to determine how far some of these are due to ordinary decay, or to the agency of some wood-boring animal, or to patches of resiniferous cells. There is evidence in places of the destructive action of parasitic fungi, but no distinct traces have been detected of fungal hyphæ. The unusually large number of resin canals in certain parts of the section, may probably be regarded as an expression of some injury sustained by the tree.

A more detailed examination of the transverse section brings to light the following structural features. The tracheids have thin and sharply defined walls, with their cavities occupied by crystalline material, probably calcite; the thinness of the walls is no doubt not an original character, but a pathological feature, or the result of partial decay before mineralization. The individual tracheids are often found to be more or less separated from one another, as in the summer wood of (Pl. II. fig. 1). As seen in (Pl. II. fig. 1), the rings of growth are sharply defined. The medullary rays stand out conspicuously by reason of the darker coloured contents of the cells, in most cases they appear in the transverse section of the stem as single rows of radially elongated cells. In the cavities of these ray cells there are often found light brown highly refractive granules; these may be the remains of cell contents, but it is difficult, or indeed impossible, to determine their exact nature, even under the highest magnifying power. In one or two places the elements of the medullary rays show faint indications of thin projections into the cell cavity; these may possibly represent the imperfectly preserved ingrowths characteristic of the medullary ray tracheids in *Pinus*, or may be faint indications of a spiral striation on the tracheid walls. Conwentz has figured examples of clearly marked striation in tracheids of the Eocene species, *Pinus succinifera* Conw.,* and less perfect suggestions of such a striature may be seen in longitudinal sections of the present species of *Pinites*.

The resin ducts in some cases have their cavity occupied by clear crystalline material, as in fig. 3; in others, again, the canal is more or less completely filled with dark coloured and somewhat rounded cells. If we compare figs. 4 and 5 with those given by Conwentz in his pl. 5. figs. 5 and 6, the two sets of canals are found to be practically identical in appearance. The filling cells are described by Conwentz as tüllen-like ingrowths of epithelial cells; that such an explanation is correct, at least in certain canals of *Pinites Ruffordi*, there is fairly clear evidence afforded by an examination of transverse and longitudinal sections. In some cases, however, the form and arrangement of the cells would seem to be characteristic of tissue in process of forming a schizolysigenous canal (*e.g.*, fig. 4). These filling cells occupying the canals, cannot well be regarded as examples of true tüllen such as Dyer, Williamson, and others have described in the tracheæ of fossil plants; they are probably, in part, ingrowths of epithelial cells, and in part the ordinary cells of the xylem parenchyma in which the resin ducts occur. There frequently occur two resin ducts in close contact, as seen in transverse section, and occasionally such become fused together; in other words, two longitudinal canals anastomose.*

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* 'Monograph. baltischen Bernsteinbäume,' 1890, p. 43. pl. 4. fig. 5, and pl. 10 fig. 4.

The darker patches seen in fig. 1 are for the most part occupied by broken fragments of tracheids: the tracheids which form the limit of these patches usually show signs of tearing and disorganisation. Some of the large oval patches are bounded by rows of tracheids, which curve round the mass of more or less completely destroyed tissue in such a manner as to suggest a forcing apart of rows of xylem elements. In many of these areas the central portion consists of clear crystalline substance, and the periphery of numerous and irregular thin brown lines presenting the appearance of delicate parenchyma; it is probable that this structure is due to fine cracks in a crystalline matrix along which brown colouring matter has been introduced.

The form and manner of occurrence of these disorganised patches suggest the presence of a parasitic fungus, such as *Trametes radiciperda;* a comparison of fig. 1 with Hartig's figure of a piece of spruce fir attacked by this fungus shows a fairly close resemblance.†

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* *Cf.* Kny, 'Botanische Wandtafeln,' p. 210, fig. 5.

† Marshall Ward, 'Timber and Some of its Diseases,' p. 151, fig. 13.

Passing to the longitudinal sections: the radial walls of the tracheids show very clearly single or double rows of bordered pits, in the latter case the pits occur in opposite pairs as seen in fig. 10. In fig. 11 is represented a slight modification of this arrangement: but this is exceptional. In fig. 6 a single bordered pit is shown on the tangential wall of a tracheid; as a rule, however, the pits are confined to the radial walls. The filled-in cavities of the tracheid are traversed by numerous cracks, which occasionally extend across from one wall to the other; in addition to these apparent septa, there occur here and there, what are in all probability true transverse septa. Such walls are not confined to the xylem parenchyma, but also occur in the tracheids. Conwentz* notes the occurrence of transverse septa in the tracheids of *Pinus succinifera*, and recognises two kinds, comparatively thick walls and others much more delicate. In the Wealden species the preservation is less perfect than in Conwentz's specimens, and no such distinction can be recognised; indeed it is always difficult in dealing with petrified plant tissues, to distinguish original from secondary structures. A thin wall in a fossil by no means necessarily means a thin wall in the living plant. The septa in a specimen of *Cordaioxylon Brandlingi*, Grand 'Eury, figured by Schenk in Zittel's 'Handbuch,'† are probably transverse walls across the tracheids, and not the septa of tüllen cells as is suggested in the description of the figure.

The character of the medullary rays is clearly shown in fig. 7; the contents of the cells have in many cases been preserved as a dark coloured or carbonized substance in the cell cavity. In fig. 6 is represented one of the comparatively short and broad medullary rays, transversed by a horizontally running resin duct. In figs. 8 and 9 is shown the nature of the pits in the medullary ray cells, these vary somewhat in size and shape; no bordered pits have been detected in these cells. The connection between the parenchyma of the medullary rays and the xylem parenchyma in which the resin ducts occur, may be recognised in the radial longitudinal sections.‡

The histological characteristics brought out by the above brief description are, I believe, such as to justify the institution

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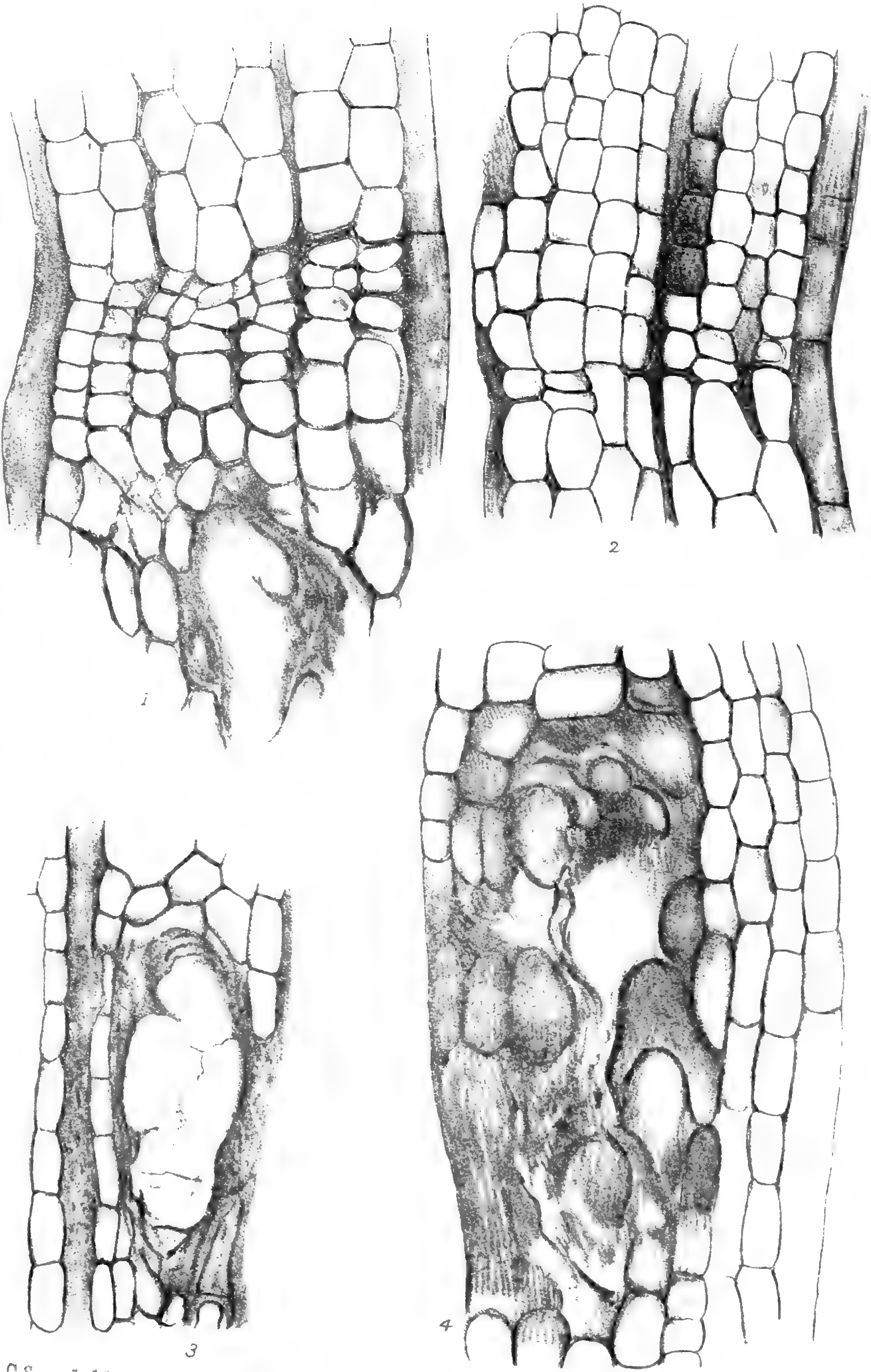
* 'Mongraph. baltischen Bernsteinbäume,' 1890, p. 44. pl. 4.

† P. 853, fig. 408.

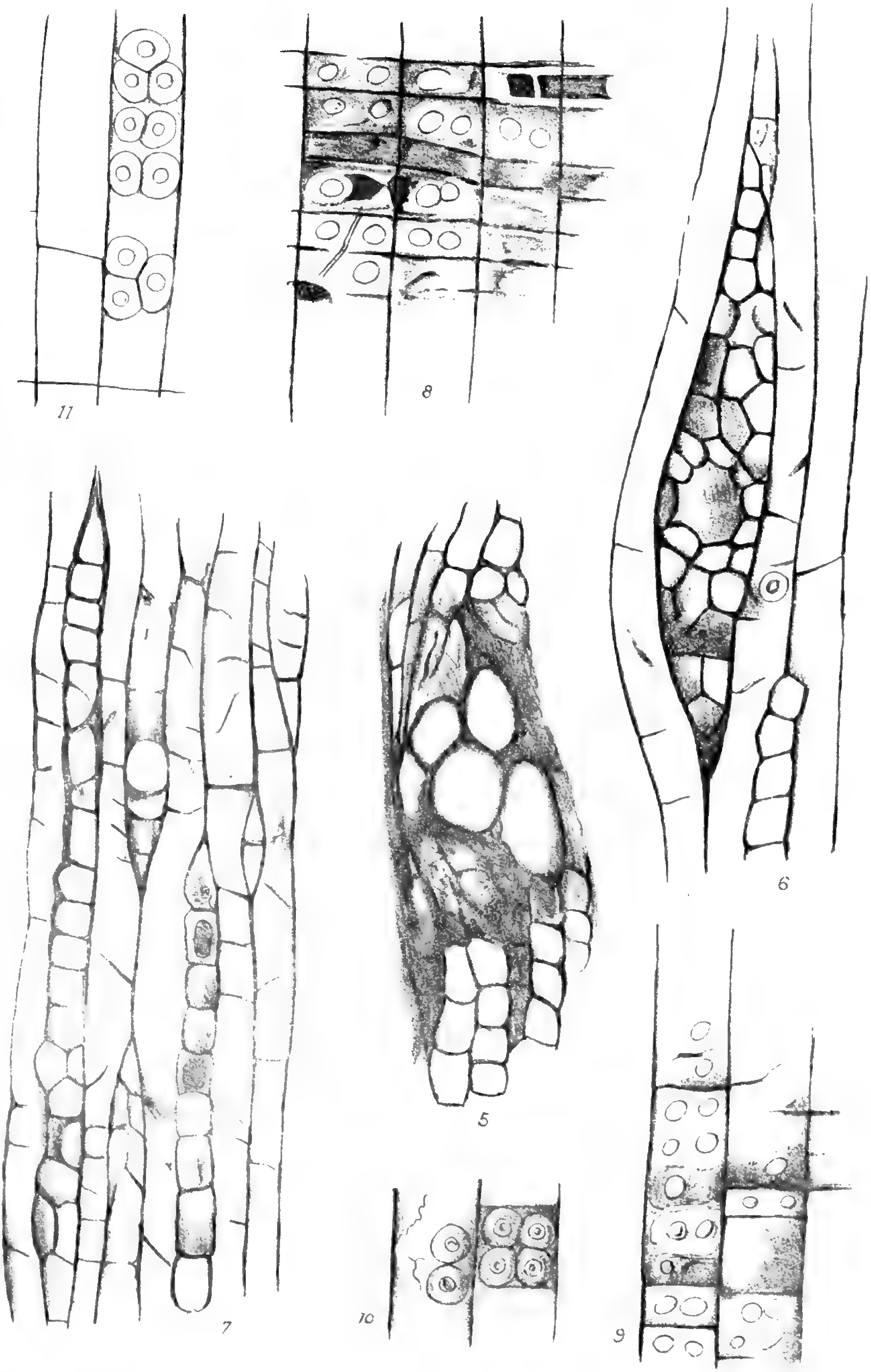
‡ *Cf.* Strasburger, Histologische Beiträge, Heft iii. p. 4.



A.C. Seward del.

J.N. Fitch lith & imp

PINITES RUFFORDI.



A.C. Seward del.

J.N. Fitch lith & imp

PINITES RUFFORDI.

of a new specific type of the genus *Pinites.* A comparison of *Pinites Ruffordi* with the type described by Göppert and Menge,* and more fully by Conwentz,† reveals a striking similarity between the Wealden and Eocene plant. The species more recently described by Conwentz as *Pinites Nathorsti*,‡ from the Lower Cretaceous Holma Sandstone of Sweden, agrees very closely with *P. Ruffordi;* in the former there are the same parenchymatous filled canals, and other points of resemblance; but in the Swedish species the bordered pits appear to occur only in single rows on the radial walls of the tracheids. Unfortunately it is seldom possible to connect petrified coniferous stems with their leaf-bearing branches and cones, and in this species we are ignorant as to the leaves and flowers borne by the branches of *Pinites Ruffordi.* In any case we have abundant evidence of the existence in Wealden rocks of a conifer possessing anatomical features practically identical with those characteristic of recent species of the genus *Pinus.*

EXPLANATION OF PLATES.

The figures are approximately 240 times natural size.

Plate II.

Figs. 1 and 2. Transverse section showing well marked zones of summer (autumn) wood, medullary ray cells, and (in fig. 1) a resin duct.

Fig. 3. Resin duct filled with crystalline material.

4. Resin duct, with small cavity, surrounded by some tüllen-like cells and partially disorganised xylem parenchyma.

Plate III.

Fig. 5. Resin duct filled with large rounded cells.

6. Tangential section showing tracheids and a broad medullary ray traversed by a resin duct.

7. Tangential section showing the different lengths of medullary rays.

Figs. 8 and 9. Radial section of pitted medullary ray cells.

10 and 11. Bordered pits on the radial walls of tracheids.

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* Göppert and Menge, 'Die Flora des Bernsteins,' vol. i. 1883, p. 27.

† Conwentz, *loc. cit.*

‡ Conwentz, "Untersuchungen über fossile Hölzer Schwedens," in 'Svensk. Vet.-Akad. Handl.,' vol. xxiv. No. 13 (1892), p. 13, pls. 1, 2, 3, 6, and 7.

On a New Species of Grass, *Bromus interruptus*, in Britain. By G. Claridge Druce, M.A., F.L.S.

[Read 5th December, 1895.]

The history of the species is as follows:—In 1888 I found what I thought was a peculiar variety of *Bromus mollis* occurring in considerable quantity in a barren chalky field, in which a crop of barley had been sown the preceding year, but which was then lying fallow. The field is situated on the Lower Chalk formation between Unwell Wood and Blewburton Camp, in Berkshire. In the adjoining fields *B. mollis* var. *glabrescens* occurred more frequently than the ordinary form. Subsequently I found the same peculiar form in smaller quantity, in a clover field on the same geological formation on the Oxfordshire side of the river, between Goring and Gathampton. An examination of our herbaria and of botanical works having failed to yield anything like these specimens, I sent a supply to the Botanical Exchange Club in 1888, under the name of *B. mollis* var. *aggregatus*. One of these Berkshire specimens was sent to Professor Hackel so labelled. He quite agreed in considering it a new variety, and while offering to retain my suggested name thought that the name *interruptus* would be more suitable, to which I willingly acceded. Professor Hackel diagnosed it as follows:—"*B. mollis* L. var. *interrupta*, mihi (Hackel). Panicula brevis, interrupta, spiculis glomeratis obovato-ellipticis, gluma sterili superiore dimidiam spiculam æquante vel superante. Affinis *B. molli* var. *conglomerato*, Persoon, Syn. i. p. 8, cujus panicula æqualiter compacta, spiculæ angustiores, villosiores."

For the last seven years I have kept the plant under observation. I find it comes true from seed, and it is fairly persistent in its localities. It must be borne in mind that so far it has only been met with in arable ground. It is by no means confined to the two fields where I first discovered it in 1888, but is found over a considerable area of the Lower Chalk cornfields.

This season it was very abundant in a field of vetches near Upton, in Berkshire. From the result of my observations I was led to believe it to be at least sub-specifically distinct from *B. mollis*, and I had described it as a species in my forthcoming

'Flora of Berkshire.' This summer Mr. L. Lester found it in a sandy cornfield, on the Coralline Oolite, between Elsfield and Headington, near Oxford, and pointed out to me that in his specimen the inner pale was split to the base. I was at once struck with the importance of this character in deciding upon its specific position, and in order to test its constancy proceeded to examine all the specimens of *Bromus* I could meet with. The result of my investigations is that I find all the specimens of *B. mollis* and its varieties, *glabrescens* and *Lloydianus*, have the upper pale entire. Some hundreds of specimens from Britain, France, Germany, Austria, Russia, Hungary, Turkey, Madeira, and Tasmania have been examined. I have also never found specimens of *B. commutatus* or *B. racemosus* with the upper palea split. On the other hand, all the specimens of *B. interruptus* which I have examined have the inner palea split to the base. This is true, not only of my gatherings of 1888, but of those gathered since that time. The specimens which have been cultivated by Mr. F. Tufnail as the var. *interruptus*, and for seeds of which I am indebted to him, show the same character. It may be well to add that specimens labelled *B. mollis* var. *interruptus*, which were collected by Captain Wolley-Dod, near Dartford Hospital, in West Kent, and sent to the Exchange Club in 1893, were referred to *B. mollis* by Professor Hackel. The two specimens in my possession from that locality, and which I referred to *B. interruptus* from their general appearance, show on examination that the palea is split.

The question may be asked: Is *B. interruptus* a native plant to Britain? This question I am unable to answer positively in the affirmative. We may urge in its favour that when it was sent to Professor Hackel seven years ago it was a new form to him, nor since that time have I been able to see a continental specimen. From its occurring exclusively in arable ground and chiefly in crops of vetches, seeds, and clover, it may be urged with some force that the designation colonist would be more suitable. In these fields I have not observed any specimens of *Silene dichotoma*, *Crepis taraxacifolia*, or *C. nicæensis*, which are often present among continental grass seeds. *B. commutatus* occurs with *B. interruptus* more frequently than *B. mollis*, although I have seen these two growing together The suggestion of its being a form due to local peculiarities of soil is, therefore, not tenable.

Mr. F. Tufnail tells me that it has been cultivated at Reading by the side of *B. mollis*, and that it keeps quite distinct. *B. interruptus* is not so much inclined to vary either as to height or condition of hairiness as *B. mollis*, and seeds of the two species may be separated one from the other.

Since the publication of the eighth edition of the 'London Catalogue' more than a hundred species have been added to the list of British plants; it is scarcely probable that botanists of another decade will agree in retaining all of these. In bringing forward the claims of an aspirant for specific distinction, I place stress upon a well-marked character which differentiates it from its nearest ally, this structural character not being made out until its peculiar habit, its more perennial growth, &c., had marked it as being a probably distinct species. In fact the suggestion made by the lamented Professor Babington in his preface to the 'Manual,' has in this instance been complied with, namely, to make the species afford the character, not the character the species.

I have seen specimens of *B. interruptus* from Oxfordshire, Berkshire, Buckinghamshire, W. Kent, and Norfolk. Mr. Tufnail says he has found it rather plentiful near Lowestoft, in Suffolk, and that he had seen specimens from Lincolnshire.

BROMUS INTERRUPTUS, mihi. Herba annua, biennis aut perennis, sæpius perennis. Spiculæ in pedicellis brevibus rigidis singillatim (alternatim dextrorsum et sinistrorsum) in rhachide dispositæ; singuli pedicelli cum 3–5 sessilibus aut subsessilibus spiculis apice pedicelli racemosim dispositi. Panicula, florem et fructum gerens, erecta angusta evidenter *interrupta*. Spiculæ, florem et fructum gerentes, erectæ primum ovali-lanceolatæ acutæ; proventu ovales et obtusæ cum 6–12 floribus glauco-viridis pubescentes. Gluma interior et vacua dimidia non supra in partem sexti floris (tertii floris in eodem latere) producta. Glumæ, florem et fructum gerentes, arcte imbricatæ. Palea inferior exterior marginibus dimidiâ parte inter mediam paleam et apicem utroque latere obtuse angulata, 5–7 costata; apice nonnihil emarginata, pubescens aut subglabra marginibus late scariosis. Arista ex una emarginatione inferioris paleæ procedens, fere directa aut erecta, paleâ nonnihil brevior. *Palea superior interior (gluma florens superior) pæne ad basin in binas angustas lanceolatas partes, paleâ* *inferiore vel exteriore dimidiâ parte aut duâbus partibus minus longas, divisa.*

Synonym. *Bromus mollis*, Linn. var. *interruptus*, Hackel, in 'Report Botanical Exchange Club British Isles for 1888,' p. 240.

The most striking feature of this plant when first seen is the inflorescence, which differs from all other species of *Bromus* known to me, in that single short stiff pedicels arise, alternately right and left of the main rachis, each bearing at its extremity 3–5 sessile (or in some cases shortly stalked) spikelets. To this fact is due the peculiar and strikingly interrupted and compact appearance of the whole inflorescence, which is made up of two rows of clustered groups of 3–5 spikelets.

This peculiar feature does not obtain in its nearest allies, since in them 4–5 slender pedicels of various lengths arise at the same level on the rachis, each bearing one or two, rarely more, spikelets; hence the inflorescence in these species is more loosely continuous.

As will be seen, the alliance of *B. interruptus* is essentially with *B. mollis*, since the larger or inner glume extends half way to the apex of the sixth floret (the third on the same side), whereas in *B. racemosus* and *B. commutatus* it reaches only to the fourth flower (the second on the same side). The texture and pubescence too of the spikelets of *B. interruptus* are similar to those of *B. mollis*. The character which at once separates *B. interruptus* from *B. mollis*, *B. commutatus*, *B. racemosus*, &c., is to be found (as pointed out to me by Mr. L. Lester, M.A., of St. John's College, Oxford) in the upper pale (the inner palea of Parnell), *which is uniformly split to the base*, and is much shorter than the outer or lower pale.

B. interruptus is further distinguished from *B. mollis* by its more perennial growth, its greater height, and narrow strict interrupted panicle. The fruits of *B. interruptus* are shorter and darker in colour with a more conspicuous groove. In *B. mollis* the palea is more or less adherent to the surface of the caryopsis, than which it is slightly narrower, so that a small margin of the fruit is to be seen. In *B. interruptus* the pales are only rarely adherent and then not to the face but to the margins of the fruit. I can see no difference in the lodicules. The suggestion may be made that the split palea may be an accidental rupture during the growth of the fruit. That it is not due to this cause is evident from the fact that examination shows the pales are split from its early flowering stage.

[In all the examples of *B. interruptus*, Druce, the upper pale is, even in the young flower, divided to the base or at least $\frac{15}{16}$ths of its length into two subequal lanceolar lobes; each of these has the green nerve down its middle (not exactly median), and the two lobes stand soon rather divaricately apart. There is nothing in any other species of *Bromus* approaching this; and no such complete division of the upper pale is well established in the whole order. Dr. Stapf has lately examined into the few alleged cases of the occurrence of a split upper pale in grasses; and he cannot find in verifying these any case parallel to that of *Bromus interruptus;* the split is either only partial, hardly half-way down, or it is mechanical, *i.e.*, does not exist in the young flower.

Hackel, of course, overlooked the split pale in *Bromus interruptus*, because he never thought of looking for anything so abnormal.

Dr. Stapf argued, when Mr. Druce's paper was read, that *Bromus interruptus*, Druce, must be treated as a monstrosity and could in no case be made a new species. It may indeed be maintained that the character of the completely bifid upper pale is either generic or monstrous, one or the other, and cannot be specific.

The remarkable uniformity with which the upper pale is split to the base in every flower, in every specimen yet got from diverse localities, may be held to negative for the present the view that *B. interruptus* is a monstrosity. Of all the innumerable species proposed as split-offs from *Bromus mollis*, there is no one so well worth a specific name as *B. interruptus*, Druce, and no one to be compared with it in morphologic interest.—C. B. CLARKE.]

The foregoing note in square brackets was drawn up 25th June, 1896, from materials kindly supplied by Dr. Stapf.

A Revision of the Genus *Pentas*. By G. F. Scott Elliot, M.A., F.L.S., F.R.G.S.

[Read 7th November, 1895.]

In the course of working out my collections, I found this genus in a very unsatisfactory state of confusion, and thought it well worth while to examine all the species carefully as a guide to their African distribution.

The following list may be found useful. Great difficulty has arisen from the new species which have been described in the interval betwixt writing and reading the paper:—

Table of Species.

Central Watershed	1.	*verticillata.*
East Africa	2.	*longituba.*
Somaliland	3.	*glabrescens.*
Arabia	4.	*Schweinfurthii.*
Comoros and Arabia	5.	*lanceolata.*
Stevenson Road	6.	*confertifolia.*
Somaliland	7.	*pauciflora.*
Masai Highlands	8.	*Ainsworthii.*
Masai and Shire Highlands	9.	*longiflora.*
General (not Western)	10.	*carnea.*
Transvaal and Natal	11.	*Woodii.*
Western and Congo	12.	*elata.*
Western and Congo	13.	*occidentalis.*
Abyssinia	14.	*Schimperiana.*
Eastern Desert	15.	*parvifolia.*
Masai Highlands	16.	*Thomsonii.*
Masai and Shire Highlands	17.	*purpurea.*
Angola, Upper Nile	18.	*arvensis.*
Western	19.	*parviflora.*
Western	20.	*volubilis.*
Angola	21.	sp. nov.
Madagascar Central	22.	*mussændoides.*
Madagascar Central	23.	*micrantha.*
Madagascar Central	24.	*hirtiflora.*

1. P. VERTICILLATA, *K. Schum. ined. MSS. in Herb. Kew.*

Central Watershed. Ukiro, *Fischer*, 319! On dry grassy hills. East side Albert Edward Nyanza, *Scott Elliot*, 8045!

Flowers in August, at from 4–5,000 feet.

2. PENTAS LONGITUBA, *K. Schum. in Pflanz. Ost-Afr.*, Bd. v. p. 377.

In rock clefts in the higher regions of East Africa, *Holst*, 418. (Specimens not seen.)

3. P. GLABRESCENS. *Baker, in Kew Bulletin*, 1895, p. 67.

Easily distinguished from *P. verticellata* by the hairy, broadly ovate petioled leaves.

Somaliland, in rocks. *Mrs. Lort Phillips* and *Miss Edith Cole*, 11, 12, 13, 14. *Miss Cole*, no. 9, seems to me a glabrous maritime form of this.

4. P. SCHWEINFURTHII, *S. Elliot*, sp. nov.

Frutex 1-metr. ramis obscure striatis breviter hirsutis; foliis 5–10 cm. long., 14–24 mm. lat. densis lanceolatis pilosis ad apicem attenuatis; acute subapiculatis vel fere obtusis ad basin attenuatis breviter (2–3 mm.) petiolatis, venis circa 12-jugis, plurime supra subtusque elevatis sed costâ supra sæpius depressâ hirsutâque, supra sparse, subtus densiuscule; stipularum setis 5–10 mm.; cymis haud congestis, floribus vix pedicellatis; calycis tubo sub-campanulato fructu lineis 10 elevatis conspicuis ornato, 5 mm. long., 4 mm. lat., lobis ovatis ad 7 mm. long.; corollæ tubo 25–30 mm. ad faucem ampliato interne albo barbato antheris (formis visis) inclusis; lobis ovatis subapiculatis, externe hirsutis 5–7 mm. long.

Arabia. "Fuch," Menacha Yemen, *Schweinfurth*, 1370! Jebel Hain, Al Hatte, near Aden, *Hunter*, 4! 20! 258! in an elevated valley, Ad Heggias, *Figari!*

Flowers white, fragrant; March to May, at from 5–7,000 feet.

5. P. LANCEOLATA, *K. Schum., MSS.* (an *confertifolia ?*).

"Arabia and Comores."

6. P. CONFERTIFOLIA, *Baker, in Kew Bulletin* (1895), p. 67.

About 5,000 feet altitude.

Zambesi—Congo Watershed. Fuambo, *Carson*, 113! 23! in Herb. Kew.

7. P. PAUCIFLORA, *Baker, in Kew Bulletin*, 1895, p. 66.

Distinguished from *P. Schweinfurthii* by the 4–7 nerved leaves and the longer 3-nerved calyx bracts.

Flowers (pink) February, to 8,000 feet, Golis Range. *Aylmer*, 10! Aalayra, Wardi, Darraas, *Mrs. Lort Phillips*, and *Miss Edith Cole*, 1, 2, 3, 4, 5, 6, 7, 8, 10!

8. **Pentas Ainsworthii**, *S. Elliot*, sp. nov.

Frutex ramis albidis subteretibus juventute dense pilis crispis conspersis; foliis ovatis vel ellipticis obtuse subacuminatis vel apiculatis ad basin attenuatis breviter petiolatis margine revoluto supra sparse pilosis (venis planis) subtus densiuscule præcipue ad venas hirsutis, venis plurime 8-jugis, 2–3 cm. long., 7–17 mm. lat., petiolis 1–2 mm.; floribus terminalibus congestis; calycis lobis subacutis externe hirsutis majore, 3–5 mm. long., 1 mm. lat.; brevioribus ad 1 mm.; corollæ tubo 22–30 mm. ad faucem per longitudinem 5 mm. dilatato, externe hirsuto, interne dense albo barbato, lobis 5–6 mm. subinflexis crispatis, externe hirsutis; antheris (formâ visâ) inclusis 4 mm.; stylo exserto, lobis hirsutis, 1 mm.

Masai Highlands. Ukambane, *Scott Elliot*, 6437. At from 4–6,000 feet. Flowers in December. From *P. longiflora* readily distinguished by the broad leaves. This is named after my kind host who has long administered the district.

9. P. LONGIFLORA, *Oliver, in Trans. Linn. Soc.*, Ser. II. (*Bot.*) vol. ii. (1887) p. 335.

Ruwenzori. Kasagama's, *Scott Elliot*, 7548!

Central Watershed. Urundi Hills, N.E. Tanganyika, *Scott Elliot*, 8038!

Masai Highlands. Sotik, Mau, *Jackson!* Ukambane, *Scott Elliot*, 6432! 6457!

Kilimanjaro. Johnston! New! Marangu, *Volkens*, 721! St. Paul!

Usambara?. Mlalo River, *Holst*, 2445!

—Var. NYASSANA, *Scott Elliot*, var. nov.; foliis fere nigris, subtus glabrioribus, stipulis ad 15 mm. longis.

Plateau North Nyassa, *Thomson!* Shiré Highlands, *Buchanan*, 475 and 85! Flowers at beginning of greater and lesser rains (November and March). Altitude 4–6,000 feet.

10. P. CARNEA, *Benth. in Bot. Mag.*, t. 4086.

The following varieties might almost be considered specifically distinct; indeed German botanists seem from MSS. notes to uphold var. c and var. d, as distinct species.

Var. a. HORTENSIS, *Scott Elliot*, var. nov.; corollæ tubo 18 mm. longo, lobis 5 mm. fere glabris, floribus carneis dimorphis.

Hort. Serampore! Kew! *T. Moore*, Chelsea! Herb. Gay! Martinique!

—Var. b. COMORENSIS, *Scott Elliot*, var. nov.; corollæ tubo 15 mm. longo; lobis 5 mm. externe vix hirsutis; floribus lilacinis fere zygomorphis, antheris plurime inclusis, sed nonnullis exsertis.

Johanna Island. *Hildebrand*, 1614! *Humblot*, 24! *Bojer! Lindsey! Hutton! Speke! Kirk! Blackburne! Terry!* Angacilla, *Brewster! Kirk!*

Mohilla (corolla lobes 3 mm. pubescence whiter) decomposed volcanic matter, Queenstown, *Bojer! Kirk! Boivin!*

Sunny places up to 1,500 feet. Flowers June to August.

—Var. c. QUARTINIANA; corollæ tubo 17 mm. longo, lobis 6 mm., externe fere glabris, antheris plurime inclusis.

Abyssinia. Banks of dry streams, Amora gellel, *Schimper*, 548! Schahagenne, *Schimper*, 93! high gorges, Madi rocks, *Speke!* open ground, Ukidi Forest, *Speke! Parkyns! Salt! Plowden!* 5,500 feet altitude.

Kilimanjaro. 6,000 feet, *Johnston!*

Ruwenzori. 9–11,000 feet, *Scott Elliot*, 7959!

Uganda, Wilson ?

Flowers (crimson?) in rains, July and November to December

—Var. d. KLOTZSCHII; corollæ tubo 13 mm., lobis 5 mm., externe sparse hirsutis, floribus dimorphicis rubris.

Eastern Desert. Ribe, *Wakefield!* Mombasa, *Kirk! Scott Elliot*, 6122!

Zanzibar. Coral, *Hildebrandt*, 1124!

Usambara. Dugobusch, *Holst*, 3211 (sub nomine, *P. zanzibarica*, in Herb. Kew).

Nyassa. *Buchanan*, 1187! 1285!

—Var. e. WELWITSCHII; wood meadows, Menino Huilla, *Welwitsch*, 5308!

11. PENTAS WOODII, *S. Elliot*, sp. nov.

Frutex ramis teretibus hirsutis; foliis lanceolatis subacutis ad basin longe attenuatis petiolatis (petiolis ad 12 mm. sed plurime 2–3 mm.), supra subtusque sparse hirsutis, venis 10-jugis, 9–16 cm. longis, 6–22 mm. latis; stipularum setis circa 10 mm.; cymæ ramis primariis plurime 4, cum 6–10 floribus albis sessilibus distantibus (more *Otomeriæ* et varietatum *P. carneæ*); calycis tubo campanulato obscure sulcato, lobis

11 mm. longis, 3 mm. latis glandulis minutis alternis; corollæ tubo gracile 15 mm., lobis 4 mm. obtuse inflexis, margine crispato, interne ad faucem barbato.

Transvaal. Barberton in bushy hillsides (*Thorncroft*, no. 49), *Wood*, 4152!, *Galpin*, 749!.

12. PENTAS ELATA, *K. Schum. in Pfl. Ost-Afr.*, Bd. v. p. 377. Himo to 2,800 m., *Volkens*, 1822.

13. P. OCCIDENTALIS, *Benth. et Hook. f. ex Oliver, Fl. Trop. Afr.*, iii. 46.

Ruwenzori. East side Kivata, *Scott Elliot*, 7684! and 7687! Wimi River, *Scott Elliot*, 7914! West Butagu Valley, *Scott Elliot*, 8022!

West Africa. Cameroons, *Mann*, 1993! 1227! Fernando Po, *Mann! Kalbreyer!*

Flowers May to July at 7,700–9,000 feet on Ruwenzori.

14. P. SCHIMPERIANA, *Vatke, in Linnea*, xl. (1876) p. 192.

Abyssinia. Mount Scholoda in rocky declivities, *Schimper*, 38! north side, *Schimper*, 916! Tigre Mount Semcigata, *Schimper*, 513! *Quartin Dillon*, 126! *Parkyns! Franqueville!* Ankobe, *Rothe*, 313!

Flowers (pinky white) July to September, over 7,000 feet altitude.

15. P. PARVIFOLIA, *Hiern, in Journ. Linn. Soc.* (*Bot.*), vol. xvi. (1877) p. 262.

Eastern Desert and Mombassa. Ukambane, *Scott Elliot*, 6416! Kibwezi, *Scott Elliot*, 6298! Mkuyuni Teita, *Scott Elliot*, 6167! Ndara Teita and Kitiu, *Hildebrandt*, 2458! Maungu, *Johnston!* Mombasa Island, *Hildebrandt*, 1994! *Wakefield!*

Flowers (red to crimson) at the beginning of the lesser and greater rains; apparently almost always below 4,000 feet altitude.

16. P. THOMSONII, *S. Elliot*, sp. nov.

Frutex congestus ubique tomento ferrugineo-sericeo vestitus; foliis lanceolatis acutis ad basin attenuatis, supra pilosis, subtus dense (venis venulisque) tomentosis, margine subrevoluto 7–15 cm. long. et 2–3 cm. lat., venis 12–16—jugis, petiolis brevibus (ad 5 mm.), stipularum setis acutis villosis 5–10 mm.; bracteis linearibus, floribus numerosis subsessilibus umbellam simulantibus; calycis lobis tubum corollæ equantibus, 6–7 mm., tubo campanulato dense hirsuto fere 3 mm. lat.; corollæ lobis fere 6–7 mm. long., 2 mm. lat., externe hirsutis, tubo ad faucem minute ampliato.

Masai Highlands. Shady place, Nandi Hills, *Scott Elliot*, 6954! Leikipia plateau (?), *Thomson*!

Flowers in December, about 6–8,000 feet altitude.

17. PENTAS PURPUREA, *Oliver, in Trans. Linn. Soc.*, vol. xxix. (1873) p. 83.

—Var. a. TYPICA; trimorphica, corollæ tubo 8 mm., lobis 2 mm., antheris vix 2 mm.

Zanzibar, dry herbaceous meadows, *Hildebrandt*, 1128! *Speke*, 15! *Kirk*, 81!

Pemba, *Kirk!*

East Coast. Usui, *Speke*, 140! Marangu, *Volkens*, 418! Ribe, *Wakefield!*

Flowers (purple or lilac) June? or September? It is very possible that the Zanzibar Island form (*P. zanzibarica*, Vatke) is scarcely the same as the East Coast specimens.

—Var. b. BUCHANANI; corollæ tubo 8 mm., dense hirsuto, lobis 3 mm., floribus congestis dimorphicis.

Shiré Highlands. Mbame villages, Manganja, *Kirk!* Sotchi, *Kirk!* Blantyre, *Buchanan*, 14! 456! 1057!

Flowers March, at 3–4,000 feet.

—Var. c. ?

Kilmanjaro, *Johnston! C. E. Smith!* At about 5,000 feet altitude. Also *Welwitsch*, 5315!

18. P. ARVENSIS, *Hiern, in Oliver, Fl. Trop. Afr.*, vol. iii. p. 47.

Nileland. On cultivation, Derargo Mittu, *Schweinfurth*, 2775!

Flowers (white, violet throat) January.

Var. VIOLACEA, *Hiern, MSS.*

Rocky slopes 2,400–3,800 feet. Pungo Andongo., *Welwitsch*, 5309, 5310, 5311!

19. P. PARVIFLORA, *Benth. in Bot. Mag.*, sub. t. 4086.

West Coast. Accra [Niger], *Vogel!* In Herb. Kew. Flowers blue.

20. PENTAS VOLUBILIS, *K. Schum.*, *MSS.*

Kamerun Yaundestation, *Zinker*, 308! No description appended to the specimen.

21. P. *sp. nov.*, Hiern, MSS.

Amongst palms Golungo Alto. Cuango River, *Welwitsch*, 5304!

22. P. MUSSÆNDOIDES, *Baker*, *in Journ. Linn. Soc.* (*Bot.*), vol. xx. (1883) p. 165.

A very abnormal form closely approaching other genera. Madagascar, wet places in forest, East Imerina, *Hildebrandt*, 3825! moist humus, Ankeramadinika, *Scott Elliot*, 1884! 1753! Andrangaloaka, *Parker! Lyall*, 195! *Baron*, 370, 1059, 1921, 4718, 4849!

23. P. MICRANTHA, *Baker*, *in Journ. Linn. Soc.* (*Bot.*), vol. xxi. (1885) p. 408.

Allied to *P. carnea.*

Tanala Forest, North and Central Madagascar, *Baron*, 310, 3292, 3980, 6295!

24. P. HIRTIFLORA, *Baker*, *in Journ. Linn. Soc.* (*Bot.*), vol. xxii. (1887) p. 482.

Nearly allied to *P. Thomsonii*, &c.

Central Madagascar, *Baron*, 4732!

EXCLUDED SPECIES.

P. INVOLUCRATA, *Baker*, *in Kew Bulletin* (1895), p. 66.

This is *Spermacoce dibrachiata*, Oliver—Fuambo, *Carson*, 40! which is common in the Shiré Highlands (*Buchanan*, 204, 1094, 3951).

P. SPECIOSA, *Baker*.

This is a new species of *Otomeria* closely allied to *O. dilatata*; this latter genus should, I think, be included in *Pentas*, but it is distinctly not advisable to make alterations in the genera unless the entire order is monographed.

The original *Otomeria dilatata*, Hiern, contains the following plants: *Barter*, 1237! Congo, *Hens*, 34! Blantyre, *Last!* Milanje *Whyte! Buchanan*, 310! 1493!

Otomeria speciosa, S. Elliot, contains *Welwitsch*, 5316! 5317! and *Scott Elliot*, 5239 and 5392! 203 miles south of Niamkolia Tanganyika, *Carson!*

Key to Collectors' Numbers.

Aylmer, 10 = P. pauciflora.

Baron, 370, 1059, 1921, 4718, 4849 = P. mussændoides; 310, 3292, 3980, 6295 = P. micrantha; 4732 = P. hirtiflora.

Barter, 1237 = Otomeria dilatata.

Buchanan, 85, 475 = longiflora; 1187, 1285 = carnea d.; 14, 456, 1057 = purpurea; 204, 1094, 3951 = Spermacoce; 1493, 310 = Otomeria dilatata.

Carson, 113, 23 = confertifolia; 40 = Spermacoce.

Scott Elliot, 7959 = carnea c.; 6122 = carnea d.; 6954 = Thomsonii 8045 = verticillata; 1884, 1753 = mussændoides; 6437 = Ainsworthii; 6432, 6457, 7548, 8038 = longiflora; 7684, 7687, 7914, 8022 = occidentalis; 5239, 5392 = Otomeria speciosa; 6416, 6298, 6167 = parvifolia.

Fischer, 319 = verticillata.

Galpin, 749 = Woodii.

Hens, 34 = Otomeria.

Hildebrandt, 1614 = carnea b.; 1124 = carnea d.; 2458, 1994 = parvifolia; 1128 = purpurea; 3825 = mussændoides.

Holst, 418 = longituba; 2445 = longiflora; 3211 = carnea d.

Humblot, 24 = carnea b.

Hunter, 20, 47, 258 = Schweinfurthii.

Kirk, 81 = purpurea.

Lort Philips and *Cole*, 9, 11–14 = glabrescens; 1–8, 10 = pauciflora.

Lyall, 195 = mussændoides.

Mann, 1227, 1993 = occidentalis.

Quartin Dillon, 126 = Schimperiana.

Rothe, 313 = Schimperiana.

Schimper, 93, 548 = carnea c; 38, 513, 916 = Schimperiana.

Schweinfurth, 2775 = arvensis; 1370 = Schweinfurthii.

Speke, 15, 140 = purpurea.

Volkens, 1822 = elata; 418 = purpurea; 721 = longiflora.

Welwitsch, 5315 = purpurea; 5308 = carnea; 5309, 5310, 5311 = arvensis var; 5316, 5317 = Otomeria speciosa; 5304 = n. sp.

Wood, 4152 = Woodii.

Zinker, 308 = volubilis.

A Revision of the Genus *Vanilla*. By R. ALLEN ROLFE, A.L.S., Assistant in the Herbarium of the Royal Gardens, Kew.

[Read 19th December, 1895.]

1. Historical Introduction, p. 439.
2. Fertilization, p. 442.
3. Affinities, p. 443.
4. Classification, p. 443.
5. Geographical Distribution, p. 443.
6. Economic Uses, p. 444.
7. Generic Characters, p. 445.
8. Key to Species, p. 446.
9. Description of Species, p. 449.

A PAPER entitled "Vanillas of Commerce" appeared in the *Kew Bulletin* in August, 1895 (pp. 169–178), in which the history of the species yielding aromatic fruits, more or less used in commerce, was given. In preparing that account it became increasingly apparent that the economic species had been hopelessly confused, both with each other and with those whose fruits are not aromatic, and, therefore, with the Directors' sanction, I undertook to revise the botany of the genus so far as the somewhat imperfect materials at hand permitted, and the results are embodied in the present paper.

I have to thank the authorities of the British Museum for facilities in comparing the specimens in that establishment, and those of the Royal Botanic Garden, Berlin, for the loan of types of two species described by Klotzsch.

HISTORICAL INTRODUCTION.

The earliest botanical notice of a species of Vanilla is given by Clusius in his 'Exoticorum Libri Decem,' published in 1605, where fruits of the true Mexican Vanilla of commerce are described under the name of *Lobus oblongus aromaticus* (p. 72). They had been obtained from Hugh Morgan, apothecary to Queen Elizabeth, but nothing appears to have been known of their native country or uses. In 1651 Hernandez figured the characteristic growth and fruits of the plant under the name of *Araco aromatico* ('Nova Plantarum Mexicanorum Historia,' p. 38), mentioning its use as a drug and recording its native name as "Tlilxochitl." In 1658 Piso added the information that it was used by the Spaniards as an ingredient in the manufacture of chocolate on account of its fragrance, and that they called it "Vaynilla" or little pod ('Mantissa,' pp. 200, 201).

Soon afterwards Dampier gave some valuable information about the same plant, which in 1676 he had seen growing on the coast of the Bay of Campeachy, South Mexico ('Voy.,' ii. p. 123), and in 1681 at Boca-toro, in Costa Rica (*l.c.*, i. p. 38). It was largely collected by the Indians, who sold it to the Spaniards. He also describes the method of curing the fruit, and remarks that the plant bears a yellow flower (*l.c.*, i. p. 234).

In 1796 a Jamaican species was confused with the preceding, both by Plukenet ('Almagest. Bot.,' p. 381) and Sloane ('Cat. Pl. Ins. Jam.,' p. 70), which is now known to be *V. inodora*, whose fruits are not aromatic. This confusion was particularly unfortunate, as it has been continued in some form or another by almost every writer down to the present time.

In 1703 Plumier briefly defined the genus *Vanilla* for the first time, enumerating three species from the West Indies ('Nov. Pl. Amer. Gen.,' p. 25), one of which still remains doubtful. The Mexican *Vanilla* was not included. In 1705 Merian figured the fruiting branch of a species from Surinam ('Metamorph. Insect. Surinam.,' t. 25), but in the text confused it with the Mexican species. Three species were now confused together, and these, in 1753, were all included by Linnæus under his *Epidendrum Vanilla* ('Sp. Pl.,' p. 952), which in turn became the *Vanilla aromatica* of Swartz on his reviving Plumier's genus *Vanilla* in 1799 ('Nov. Act. Soc. Sc. Upsal.,' vi. p. 66). A leafless West Indian species, *V. claviculata*, was now added for the first time.

The Mexican *Vanilla* had been introduced to cultivation prior to 1739, when the second edition of Miller's 'Gardener's Dictionary' was published, but appears to have been again lost. It was, however, re-introduced by the Marquis of Blandford and flowered in the collection of the Right Hon. Charles Greville, at Paddington, prior to 1807, in which year a flowering specimen was figured and described by Salisbury under the name of *Myobroma fragrans* ('Parad. Lond.,' t. 82), and a year later Andrews published another figure as *Vanilla planifolia* ('Bot. Rep.,' viii. t. 538). Both of these authors wrongly identified the plant with a West Indian species, and both equally failed to recognise in it the true Mexican *Vanilla* of commerce, whose flowers were now figured for the first time. It is not a little curious that Francis Bauer should have prepared a drawing from the self-same plant in 1807, showing a fresh fruit. The plate was not published until some years later, between 1830 and 1838 ('Ill. Orch. Pl., Gen.,' tt. 10, 11), but a note states that it was "drawn by Mr. Bauer in 1807." This is the first evidence of the production of fruit in Europe. How the flower became fertilized is not known.

Accounts of the *Vanilla* in its native habitat were successively published by Aublet in 1775 ('Hist. Pl. Guian. Franc.,' ii. Mem. 4, pp. 77–85), by Humboldt in 1811 ('Voy. de Humb. et Bonpl.,' pt. 3, vol. ii. p. 437), and by Schiede in 1829 (Linnæa, iv. pp. 573–576), chiefly with regard to their economic aspect, though the latter described four supposed new species, all of which, however, were previously known under other names. In 1825 Blume described two species from the Malayan Archipelago ('Bijdr.,' p. 422) and a third which had flowered in the Buitenzorg Botanic Garden, whence it had been obtained from Europe, and which subsequently proved to be *V. planifolia*.

In 1838 a remarkable paper was read before the British Association at Newcastle by Professor Charles Morren, entitled, "On the production of Vanilla in Europe," which was published in the following year (Ann. Nat. Hist., Ser. I. iii. pp. 1–9), in which the author showed how he had obtained two large crops of pods by fertilizing the flowers artificially, and suggested that its failure to fruit in India was probably due to the absence of some species of insect which doubtless existed in Mexico, and there fertilized the flowers.

In 1840 Dr. Lindley admitted twelve species in his 'Genera and Species of Orchidaceous Plants' (pp. 434–437), but several of these are much confused and others synonymous, most of the old errors being here reproduced. Since that period about 25 additional species have been described in various scattered publications, and in 1895 a full account of the species known to have aromatic fruits appeared in the *Kew Bulletin* (pp. 169–178), in which the history of the economic species was traced and two additional ones described; but no systematic revision of the entire genus has been attempted until now.

In the present paper 50 species are admitted, of which 17 are new, including five which have been confused with previously known forms. Several, however, are still very imperfectly known, and it is greatly to be wished that those who have the opportunities would collect a series of flowering and fruiting specimens, which would materially assist in completing our knowledge of this very difficult genus.

FERTILIZATION.

Owing to their highly complex structure the flowers are incapable of self-fertilization, and in the case of *V. planifolia*, which is so largely cultivated as an economic plant, artificial fertilization is invariably practised, except in Mexico and Central America, where the species is indigenous. Here Deltiel records that the flowers are fertilized by bees of the genus *Melipone*, which visit the flowers for the honey they afford. I have not succeeded in finding any further records on the subject, and it would be interesting if this point could be cleared up. In other regions nothing whatever seems to be known of the insects which fertilize the flowers, although the genus is so widely diffused through the tropics. As regards *V. planifolia* it may be said that the flowers are fragrant, and that they secrete a large amount of honey at the bottom of the tube, which would naturally attract insects. The front lobe of the lip is reflexed and somewhat rough, and thus would afford a lighting place for the insect, which would then crawl into the tube to suck the honey. A small bee would easily get the front part of its body past the anther, because the appendages of the crest are all deflexed towards the base, but on retreating these would present an obstacle, and in order to pass them the bee would have to elevate its body, and thus would press against the incumbent anther and dislodge the pollinia. In what way these become attached to the insect in this case is perhaps not known, but it may be safely assumed that they do become so attached and are carried away. On retreating from the flower the bee would also lift up the flap-like rostellum which protects the stigma, and thus any pollen would inevitably be deposited on the latter and fertilize the flower. In other species of the genus the structure is similar, so that it may safely be assumed that fertilization is effected in the same way.

AFFINITIES.

Vanilla belongs to the small subtribe *Vanilleæ*, which comprises also *Epistephium*, *Eriaxis*, *Galeola*, *Sobralia*, and *Sertifera*, though the latter two are excluded by Pfitzer. The species of *Epistephium* are erect herbs, natives of tropical America, with purple flowers and a calyculus at the base of the perianth segments—an organ which is also found in *Vanilla palmarum*. The species of *Galeola* are leafless saprophytes, in colour ranging from yellow to brown and red; the genus ranges from India and Japan to Australia. *Eriaxis* is from New Caledonia and has been referred to the latter, but has leafy shoots besides some differences in structure. *Sobralia* and *Sertifera* are erect herbs, natives of tropical America, and quite distinct in habit.

CLASSIFICATION.

In the following enumeration an attempt has been made to arrange the species in as natural a sequence as possible, so far as the materials at hand permitted, but some modification is sure to be found necessary when flowers and fruit of all the species are known. Owing to the incomplete materials of some of the species, I have had to utilise geographical limitations in a few cases in the key, but in all such cases the species bracketed together appear to be intimately allied. The division into leaf-bearing or leafless species seems to be the most natural, and the latter evidently forming a very highly specialized group are placed at the end. Conversely, those with the tube extremely short and the lip without a central crest are placed at the beginning, being obviously the least specialized. The remainder form a fairly natural transition between the two.

GEOGRAPHICAL DISTRIBUTION.

The genus is widely diffused throughout the forest region of the tropics, but the species themselves are very local. From the annexed table it will be seen that of the 50 species, 29 are American, 11 Asiatic, and 10 African, the headquarters of the genus being in Brazil and Guiana, where 15 species occur, but of these only four are common to both, so far as our present knowledge extends.

Endemic Species of *Vanilla*.

Central America	*Pfaviana, planifolia.*
West Indies	*phœantha, claviculata, barbellata, Eggersii, Poitœi.*
Brazil and Guiana	*ovata, organensis, acuta, parvifolia, palmarum, Hostmanni, Gardneri, Vellozii, carinata, bicolor, appendiculata, Chamissonis.*
Colombia	*Methonica, Sprucei, columbiana, ensifolia.*
Peru and Ecuador	*hamata, Ruiziana, odorata.*
West tropical Africa	*africana, acuminata, cucullata, ramosa, ovalifolia, grandifolia.*
East tropical Africa	*Roscheri.*
Mascarene Islands	*madagascariensis, Phalœnopsis, Humblotii.*
Ceylon and S. India	*Moonii, Wightiana, Walkeriœ.*
Burma	*Parishii.*
Malaya	*Griffithii, albida, borneensis, palembanica, aphylla.*
Philippine Islands	*philippinensis, calopogon.*

Distributed Species of *Vanilla*.

West Indies, Brazil, and Guiana	*Wrightii.*
Central America, West Indies, Brazil, and Guiana	*inodora.*
Central America, Brazil, Guiana, and Columbia	*Pompona.*

ECONOMIC USES.

The fruit of *Vanilla planifolia* is the true Vanilla of commerce, which is said to have been first brought to Europe as a perfume about the year 1510. For some time it was also used in medicine, but soon passed entirely into the hands of the confectioners, by whom it is very largely used for flavouring purposes. At first collected only in Mexico and Guatemala, where it is indigenous, it has also been cultivated there for nearly a century, and some time later it was introduced into other tropical countries, where, however, artificial fertilization has to be practised. In Réunion, where the industry commenced about half a century ago, it is estimated that probably 3,000 acres are under cultivation, and the crop of 1889 exceeded 500,000 lbs. It is also cultivated in the Seychelles, Mauritius, Java, Tahiti, and Fiji. The finest Vanilla is said to be still produced in Mexico, and in 1891 the amount imported into the United States was 135,875 lbs., this being the chief market for Mexican Vanilla.

The fruit of *V. Pompona* comes into the market under the name of Vanillons, the bulk of those entering into commerce being obtained from the West Indies; Guadeloupe and Martinique being the principal places of export. Some are also collected in Mexico from wild plants. Their principal consumption is said to be among the tobacco manufacturers and perfumers, for the manufacture of sachet powders. The fruits are very fleshy and difficult to dry, but are largely used in a fresh state for flavouring confectionery.

The source of what is known as South American Vanilla is a little doubtful, but is thought to be *V. Gardneri*, for Gardner says:—"This is the plant which yields the Vanilla (Banilha of the Brazilians) in Brazil," and fruits in the Kew Museum labelled "Brazilian or Bahia Vanilla," have the same rank odour as is ascribed to "South American Vanilla." Of the latter, as much as 9,000 lbs. are said to have been imported into the United Kingdom in 1891, and it has been suggested that it is chiefly used as an adulterant.

V. phæantha has also been cultivated in the West Indies, but its fruits are said to possess very little perfume. *V. odorata* and *V. appendiculata* have also aromatic fruits, but are not known in commerce. Humboldt also records one as occurring in Peru; it is probable that our information under this head is still very imperfect.

GENERIC CHARACTER.

VANILLA, *Sw. in Nov. Act. Soc. Sc. Upsal.*, vi. (1799) p. 66, t. 5. Sepala subæqualia, libera, patentia vel subpatentia. Petala sepalis subsimilia. Labelli unguis columnæ plus minusve adnatus, sæpissime tubum longum formans, limbus latus, integer vel trilobus, facie lævis, puberulus vel varie appendiculatus, medio sæpius cristatus, columna elongata, subincurva, apoda, ad latera stigmatis biauriculata. Anthera margini clinandrio affixa, incumbens, convexa vel semiglobosa, operculata, loculis discretis, pollinia pulvereo-granulosa. Stigma transversum sub rostello situm; rostellum latum subarticulatum. Capsula linearis vel oblonga, carnosa, tarde dehiscens; semina nigra, nitida.

Herbæ validæ, alte scandentes, ramosæ, foliosæ vel aphyllæ, ramis radices adventicias emittentibus. Folia coriacea vel carnosa, sessilia vel breviter petiolata. Racemi sæpissime axillares, subsessiles vel pedunculati. Flores magni. Bracteæ ovatæ vel oblongæ sæpius parvæ. *Lindl., Gen. and Sp. Orch.*, p. 434; *Bauer, Ill. Orch. Gen.*, tt. 10, 11; *Benth. et Hook. f., Gen. Pl.*, iii. p. 590. Myobroma, *Salisb. Parad. Lond.*, t. 82.

KEY TO SPECIES.

A. Stems leafy .... Section FOLIOSÆ.
* Disc of lip without a crest or tuft of hairs or appendages.
† Lip three-lobed, adnate to column at base only.
‡ Stem leaves 4–7 in. long, or occasionally longer.
a. Leaves broadly elliptic-lanceolate or elliptic-ovate.
a. Leaves elliptic ovate to elliptical.
i. Inflorescence axillary or subterminal; bracts much smaller than leaves.
α. Sepals and petals 6–7 lin. broad.... 1. *V. inodora.*
β. Sepals and petals 3–4 lin. broad.
Leaves ovate. Guiana species.... 2. *V. ovata.*
Leaves elliptic - ovate. New Granada species .... 3. *V. Methonica.*
ii. Inflorescence terminal; bracts large and leaf-like .... 4. *V. Pfaviana.*
aa. Leaves elliptic-lanceolate .... 5. *V. organensis.*
aa. Leaves oblong.... .... 6. *V. acuta.*
‡‡ Stem leaves about 3 in. long .... 7. *V. parvifolia.*
†† Lip entire or subentire, adnate to sides of column, up to middle or beyond.
Inflorescence axillary; fruits elongate-linear .... 8. *V. Wrightii.*
Inflorescence terminal; fruits linear-oblong .... 9. *V. palmarum.*
** Disc of lip with a central crest or tuft of hairs or appendages.
† Tube, formed by union of sides of lip with column, about as broad as long.

‡ Front lobe of lip acute or apiculate. African species.
a. Leaves broadly lanceolate or elliptic-lanceolate.
i. Column with upper third free from lip.
Leaves 2–5 in. long; front lobe of lip triangular .... 10. *V. africana.*
Leaves 6–7 in. long; front lobe of lip broadly oblong.... .... 11. *V. acuminata.*
ii. Column with upper two-thirds free from lip .... 12. *V. cucullata.*
b. Leaves oblong or elliptical-oblong.
Leaves 4–6 in. long; front lobe of lip acute .... 13. *V. ramosa.*
Leaves 3–3½ in. long; front lobe of lip subobtuse .... 14. *V. ovalifolia.*
‡‡ Front lobe of lip retuse or emarginate. Asiatic species .... 15. *V. Griffithii.*
†† Tube, formed by union of sides of lip with column, much longer than broad.
Leaves very broadly elliptic-ovate or suborbicular .... 16. *V. grandifolia.*
Leaves oblong-elliptic or narrower.

Asiatic species.

a. Racemes 6 in. long; fruit oblong .... 17. *V. philippinensis.*
β. Racemes 1½–3 in. long; fruit linear-oblong or elongate linear.
i. Fruit elongate-linear.
Leaves oblong or oblong-lanceolate.
Bracts numerous, crowded .... 18. *V. albida.*
Bracts few, lax .... 19. *V. borneensis.*
Leaves ovate .... 20. *V. palembanica.*
ii. Fruit linear-oblong .... 21. *V. Moonii.*

American species.

Leaves elliptic-lanceolate or broadly lanceolate, equally tapering at both ends .... 22. *V. Sprucei.*
Leaves elliptic-oblong to linear-lanceolate, not equally tapering at both ends.
Leaves broadly elliptical .... 23. *V. hamata.*
Leaves oblong or narrower.

* Leaves oblong or elliptical-oblong.
† Nerves of lip smooth or verrucose.
§ Sepals and petals $1\frac{3}{4}$ in. long, or longer.

Extra-Brazilian species.
a. Bracts oblong or linear-oblong, small.
Disc of lip smooth .... 24. *V. Hostmanni*
Disc of lip verrucose .... 25. *V. planifolia.*
b. Bracts elliptical or elliptical-oblong, larger.
Fruits subcylindrical, 3 in. long .... 26. *V. phæantha.*
Fruits trigonous, 5–7 in. long .... 27. *V. Pompona.*

Brazilian species.
a. Lip not strongly keeled in front.
Bracts subdistichous .... 28. *V. Gardneri.*
Bracts scattered .... 29. *V. Vellozii.*
b. Lip strongly keeled in front.... .... 30. *V. carinata.*
§§ Sepals and petals $1\frac{1}{2}$ in. long .... 31. *V. columbiana.*
†† Nerves of lip bearing small foliaceous appendages.
Lip with broad sub-obtuse apex .... 32. *V. bicolor.*
Lip with narrow acute apex.... .... 33. *V. appendiculata.*
** Leaves linear-oblong or linear-lanceolate.
a. Leaves over an inch broad.
Leaves broad at base. Brazilian species 34. *V. Chamissonis.*
Leaves somewhat narrowed at base. Peruvian species .... 35. *V. Ruiziana.*
β. Leaves $\frac{1}{2}$ to scarcely an inch broad.
Leaves ensiform, 7–10 lin. broad .... 36. *V. ensifolia.*
Leaves linear-lanceolate, 5–7 in. broad 37. *V. odorata.*

B. Stems aphyllous, or with leaves reduced to bract-like scales .... Section Aphyllæ.

* Sepals and petals $1–1\frac{3}{4}$, or rarely 2 in. long.
† West Indian species.
a. Scales $\frac{1}{2}$–2 in. long, and rather narrow.
Disc of lip glabrous, or nearly so .... 38. *V. claviculata.*
Disc of lip barbellate.... .... 39. *V. barbellata.*
b. Scales $2\frac{1}{2}$–$3\frac{1}{2}$ in. long, and rather broader .... 40. *V. Eggersii.*
†† Asiatic species.
a. Hairs on disc of lip 2 or more lines long.
Hairs on disc of lip arranged in a single median line .... 41. *V. aphylla.*

Hairs on disc of lip numerous and spreading.	
Lip 3-lobed, with broad side lobes	42. *V. Parishii.*
Lip obscurely 3-lobed	43. *V. calopogon.*
b. Hairs on disc of lip under 1 lin. long	44. *V. Wightiana.*
** Sepals and petals 2–3½ in. long	
a. Lip glabrous, with two pubescent lines from base to middle.	
i. Ceylon species	45. *V. Walkeriæ.*
ii. African species.	
Continental African species	46. *V. Roscheri.*
Mascarene species.	
Hairy lines of disc nearly obsolete. (Madagascar)	47. *V. madagascariensis.*
Disc with two broad pubescent lines below middle. (Seychelles)	48. *V. Phaælnopsis.*
b. Lip velvety, disc villose towards the centre	49. *V. Humblotii.*
Section doubtful. Lip margined and veined with dark violet. Santo Domingo species	50. *V. Poitæi.*

DESCRIPTION OF SPECIES.

Sect. I. FOLIOSÆ.—Caules foliati, foliis alternis variis. Sp. 1–37.

1. VANILLA INODORA, *Schiede, in Linnæa*, iv. (1829) p. 574, et vi. (1831) p. 59; caule crassiusculo, paullo flexuoso; foliis subsessilibus ovato-ellipticis vel elliptico-oblongis breviter acuminatis; racemis axillaribus vel subterminalibus flexuosis; bracteis ovato-oblongis vel lanceolato-ovatis subacutis rarius foliaceis; sepalis petalisque lanceolato-oblongis subobtusis; labello trilobo sepalis petalisque fere æquilongo latissimo basi columnæ adnato, lobis lateralibus oblongis obtusis, lobo intermedio late ovato-oblongo subacuto; disco tricarinato, columnâ clavatâ; capsulis lineari-elongatis gracilibus inodoris.—*Lindl., Gen. and Sp. Orch.*, p. 437; *Klotzsch, in Bot. Zeit.*, iv. (1846) p. 564; *Hemsl., Biol. Centr. Amer.*, iii. p. 294.

Epidendrum Vanilla, *L. Sp. Pl.*, ed. I. p. 952 (partim).

Vanilla mexicana, *Mill., Gard. Dict.*, ed. 8 (1768), n. 1 (partim). V. aromatica, *Sw. in Nov. Act. Soc. Sci. Upsal.*, vi. (1799) p. 66, *et in Schrad. Journ.*, ii. p. 208 (partim); *Lindl., Gen. and Sp. Orch.*, p. 434 (partim); *Cogn. in Mart. Fl. Bras.*,

iii. IV. p. 149 (partim). V. Epidendrum, *Mirb., Hist. Pl.*, ed. II. ix. p. 249 (partim). V. guianensis, *Splitg. in Ann. Sc. Nat.*, sér. II. xv. (1841) p. 279 (partim); *De Vriese in Tuinb. Fl.*, iii. pp. 78, 81, tt. 5, 6 (excl. fruit); *Cogn., l.c.*, p. 151 (partim). V. surinamensis, *Reichb. f. in Nederl. Kruidk. Arch.*, iv. (1859) p. 321 (partim). V. anaromatica, *Griseb., Fl. Brit. W. Ind.* (1864) p. 638; *et Cat., Pl. Cub.*, p. 267.

Hab. Mexico, W. Indies et Guiana. South Mexico, Misantla, *Schiede!* Mirador, *Liebman*, 297! Nicaragua, *Seemann*, 181! Jamaica, *Purdie! Morris!* Cuba, *Wright*, 3353! Porto Rico, Sierra de Luguillo, *Eggers*, 1322! *Sintenis*, 1739! San Domingo, *Eggers*, 2086! Dominica, *De Ponthieu! Imray*, 138! *Ramage!* Trinidad, *Crueger!* Surinam, *Hostman*, 71! British Guiana, Mazaruni River, *Jenman*, 682! Pomeroon River, *Jenman*, 1614!

Folia 3–11 poll. longa, 1½–4½ poll. lata. Racemi 3–5 poll. longi. Bracteæ ¼–1¼ poll. longæ. Pedicelli 1½ poll. longi. Sepala et petala 1¾–2 poll. longa, 5–7 lin. lata. Labellum 1½–1¾ poll. longum. Columna 1 poll. longa. Capsula 5–10 poll. longa.

The history of this common species has been much confused. It was originally described by Plumier in 1703 ('Nov. Gen. Pl. Amer.,' p. 25) as *Vanilla flore viride et albo, fructu nigrescente*, and afterwards figured ('Pl. Amer.,' ed. Burm., p. 183, t. 188), on the latter occasion being confused with various other species, including the true Vanilla of commerce. Linnæus failed to detect this confusion when establishing his *Epidendrum Vanilla*, and both Miller and Swartz repeated the error when establishing their species; both cited Plumier's figure, and Swartz applied a misleading specific name in consequence, for it is now known that the fruit is not aromatic. Splitzgerber was not more fortunate, for he re-described what are evidently flowering specimens of this and fruits of *V. Pompona* under the name of *Vanilla guianensis*, and De Vriese afterwards figured the same combination. Reichenbach followed, changing the name to *Vanilla surinamensis*, evidently through a slip. That Splitzgerber fell into this error is apparent from his remarks, for he was only able to distinguish the species from *V. aromatica* by its different fruit, and these he identified with those figured by Merian ('Metamorph. Insect. Surinam.,' t. 25), and described by Aublet ('Hist. Pl. Guian. Franc.,' ii. Mém. 4, p. 79). The fruit figured by De Vriese is characteristic of *V. Pompona*, and the bracts quite different from those of his flowering specimen. The flowers and fruit of both species are now well known, and the confusion is therefore evident. Grisebach changed the name to *Vanilla anaromatica*, evidently on the ground that the fruit is not aromatic, but wrongly excluded *V. guianensis* (probably because of the fruit) and Catesby's figure ('Nat. Hist. Carol.,' i. App., p. 7, t. 7). In Martius's 'Flora Brasiliensis,' *V. aromatica* and *V. guianensis* are kept distinct by Cogniaux, but four specimens representing *V. organensis*, Rolfe, are included under the former, and the description is evidently partly drawn from them. *V. inodora*, Schiede, was described from fruiting specimens which belong here, and as the name is the earliest correct one which was applied to the species it is here adopted.

2. VANILLA OVATA, *Rolfe;* caule subgracili suflexuoso; foliis breviter petiolatis ovatis subacutis; racemis axillaribus vel subterminalibus gracilibus paucifloris; bracteis ovatis subacutis; sepalis petalisque lineari-oblongis subacutis undulatis; labello trilobo basi columnæ adnato, lobis lateralibus oblongis apice rotundato-obtusis, lobo intermedio late oblongo subobtuso; disco tricarinato; columnâ clavatâ.

Hab. Guiana, *Martin!* (Mus. Brit.)

Folia 6½ poll. longa, 4 poll. lata. Racemi 4–5 poll. longi. Bracteæ 4–9 lin. longæ. Pedicelli 1½ poll. longi. Sepala et petala 1½ poll. longa, 3–4 lin. lata. Labellum 1½ poll. longum. Columna 1 poll. longa. Capsula ignota.

Distinguished from the preceding by its more slender stems and racemes, and its smaller flowers with narrower segments.

3. V. METHONICA, *Reichb. f. et Warsz. in Bonplandia*, ii. (1854) p. 97; caule subgracili flexuoso; foliis elliptico-oblongis breviter acuminatis vel subobtusis; racemis lateralibus paucifloris; bracteis oblongis vel elliptico-oblongis subacutis; sepalis petalisque lineari-oblongis acutis undulatis; labello trilobo basi columnæ adnato, lobis lateralibus oblongis apice rotundatis, lobo intermedio brevi triangulari-ovato subobtuso; disco medio nervis crassiusculis apice ruguloso; columnâ clavatâ; capsulâ (ex Reichb. f.) "maxime aromaticâ."

Hab. New Granada, 6,000–8,000 ped., *Warszewicz!* Antioquia, *Patin!* Ibague, *Goudot!*

Folia 2–8 poll. longa, 1–2¾ poll lata. Bracteæ 4–6 poll. longæ. Sepala et petala 1½–1¾ poll. longæ. Labellum 1¼ poll. longum. Columna 1 poll. longa. Capsula (ex Reichb. f.) "5–6 poll. longa."

Reichenbach describes the fruit as very aromatic and states that it yields the finest Vanilla which comes into the market, though how he obtained the information cannot be ascertained. Part of the type specimen is in Lindley's Herbarium, but is only in the flowering stage, while the fruits of other species of this group, so far as known, are not aromatic; so that, no other evidence of the occurrence of an economic species in New Granada being obtainable, some mistake must be suspected.

4. VANILLA PFAVIANA, *Reichb. f. in Gard. Chron.*, N.S. xx. (1883) p. 230; caule flexuoso gracili; foliis oblongis acuminatis; racemis terminalibus; bracteis foliaceis oblongo-lanceolatis acutis; sepalis petalisque oblongis acutis tortilibus; labello trilobo basi columnæ adnato, lobis lateralibus oblongis, lobo intermedio producto emarginato crenato; disco medio crassiusculo.

Hab. Mexico, *Pfau.*

Folia 4–6 poll. longa.

Only known from the original description. It is evidently allied to the preceding, but in what respect it differs is uncertain, both species being very imperfectly known.

5. V. ORGANENSIS, *Rolfe;* caule subgracili; foliis subsessilibus lanceolato-oblongis subacuminatis; racemis terminalibus paucifloris; bracteis foliaceis, sepalis petalisque lineari-lanceolatis subacuminatis apice recurvis marginibus crispo-undulatis; labello sublibero trilobo, lobis lateralibus rotundato-oblongis, lobo intermedio oblongis acuto; disco ecristato nervo medio paullo incrassato; columnâ clavatâ; capsulâ elongato-lineari.

V. aromatica, *Lindl., Gen. and Sp. Orch.*, p. 434, partim (*non Sw.*); *Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 150, partim (*non Sw.*).

Hab. Brazil, Organ Mountains, at margin of waterfall, *Gardner*, 632! *Miers!* Near Rio de Janeiro, *Glaziou*, 11,620, 14,320!

Folia 2½–5 poll. longa, ¾–1¾ poll. lata. Pedicelli 2 poll. longi.

Sepala et petala 1¼–1¾ poll. longa. Labellum 1¼–1½ poll longum. Columna 10 lin. longa. Capsula 5 lin. longa.

Readily distinguished from *V. inodora*, Schiede (*V. aromatica*, Sw.), with which Lindley and subsequent authors have confused it, by its terminal inflorescence, with large leaf-like bracts, narrower sepals and petals, and other characters. The fruit is not aromatic.

6. VANILLA ACUTA, *Rolfe*; caule crassiusculo; foliis breviter petiolatis elliptico-oblongis; racemis axillaribus brevibus paucifloris flexuosis; bracteis ovatis acuminatis; sepalis petalisque oblongo-lanceolatis acutis; labello basi columnæ adnato trilobo, lobis lateralibus oblongis, lobo intermedio ovato-oblongo subobtuso; disco ecristato nervis tribus incrassatis apice rugulosis; columnâ clavatâ.

Hab. Surinam, *Kappler!* A drawing by Schomburgk (at the British Museum) labelled River Berbice, British Guiana, probably belongs here.

Folia 6–7 poll. longa, 3 poll. lata. Racemi 2–2½ poll. longi. Bracteæ 5–8 lin. longæ. Pedicelli 2 poll. longi. Sepala et petala 1½ poll. longa, 6 lin. lata. Labellum 1½ poll. longum. Columna 1 poll. longa.

Allied to the preceding, but readily distinguished by the oblong leaves, acuminate bracts, more acute sepals and petals, and by the proportionately narrower lip. The flowers are described by Kappler as yellow. Schomburgk's drawing has greenish sepals and petals and a whitish lip, but it agrees so well in other respects that I think it must be this species. It shows an elongate-linear fruit 5 inches long.

7. V. PARVIFOLIA, *Rodr., Gen. et Sp. Orch. Nov.*, ii. (1881) p. 271; caule subgracili internodiis brevibus; foliis ovato-oblongis brevissime acuminatis; racemis terminalibus paucifloris, bracteis foliaceis; sepalis petalisque lanceolato-oblongis subobtusis; labello libero trilobo, lobis lateralibus rotundato-oblongis, lobo intermedio semiorbiculari margine plicato-undulato; disco medio crassiusculo nervis paullo elevatis, columnâ glabrâ; capsulâ lineari-oblongâ.—*Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 151, t. 33.

Hab. Brazil, in the forests of Parana, near Curityba, *Rodrigues.*

Folia 1¼–3 poll. longa, 1–1½ poll. lata. Pedicelli 2 poll. longi. Sepala et petala 2 poll. longa. Labellum 1½ poll. longum. Columna 1 poll. longa.

Allied to the preceding, but readily distinguished by its three-lobed lip and longer fruit, which is probably not aromatic. The flowers are green. I have only seen a drawing.

8. VANILLA WRIGHTII, *Reichb. f. in Flora,* xlviii. (1865) p. 273; caule subgracili; foliis elliptico- vel lanceolato-oblongis subobtusis vel rarius acutis breviter petiolatis; racemis brevibus paucifloris, rhachi subcompresso, bracteis distichis triangulari-ovatis obtusis conduplicato-concavis; sepalis petalisque lanceolatis subobtusis; labello integro; disco lævi; columnâ clavatâ; capsulâ elongato-lineari gracili.—*Griseb., Cat. Pl. Cub.,* p. 267.

V. claviculata, *Lindl. in Ann. and Mag. Nat. Hist.,* Ser. III. i. (1858) p. 334; *et in Mem. Am. Acad.,* N.S., viii. p. 219 (*non Sw.*). V. palmarum, *Griseb., l.c.; Sauv., Fl. Cub.,* p. 232 (*non Lindl.*). V. lutea, *Wright, ex Griseb., l.c.; Sauv., l.c.* V. gratiosa, *Griseb., l.c.*; *Sauv., l.c.* V. palmarum, *Cogn. in Mart. Fl. Bras.,* iii. pars IV. p. 152 (partim).

? V. palmarum var. grandifolia, *Cogn., l.c.,* p. 154.

Hab. W. Indies and Guiana. Cuba, without locality, *Wright,* 672! Monte de la Prenda, at 2,000 feet alt., *Eggers,* 5248! Trinidad, *Fendler,* 1007! Surinam, *Hostman,* 33! British Guiana, Macouria River, *Jenman,* 2561! Kaieteur Savannah, Potaro River, *Jenman,* 803! A drawing by Schomburgk (at the British Museum) from British Guiana, labelled "Dry savannahs, chiefly on skirts of woods, climbing on trees," probably belongs here. The flowers are white with the front of the lip yellow.

Folia 2–3 poll. longa, ¾–1¼ poll. lata. Bracteæ 2–3 lin. longæ. Sepala et petala 2 poll. longa. Labellum 2 lin. longum. Columna 1¼ poll. longa. Capsula 5–6 poll. longa.

This species has been curiously confused with *Vanilla claviculata,* Sw., and *V. palmarum,* Lindl., the former leafless and the latter easily distinguished by its terminal inflorescence and very short fruit. Grisebach appears not to have seen a specimen of what he calls *V. palmarum* (apparently citing it from Wright's note), but it probably belongs here, for there is no other

evidence that that species grows in the West Indies, and Lindley himself wrongly labelled Hostman's specimen cited above as *V. palmarum*. *V. palmarum var. grandifolia, Cogn.*, is referred here with some doubt, on account of its much longer leaves, which are described as about 5 inches long.

9. VANILLA PALMARUM, *Lindl.*, *Gen. and Sp. Orch.* (1840) p. 436 (*excl. syn. Fl. Flum.*); caule subgracili internodiis brevibus; foliis sessilibus elliptico-ovatis vel ovato-oblongis subobtusis; racemis terminalibus, bracteis ovato-oblongis subacutis; sepalis petalisque lanceolato-oblongis subobtusis; labello columnæ semiadnato integro obovato retuso vel apiculato; disco infra medium lineâ mediâ instructo; columnâ facie villosâ; capsulâ oblongâ paullo falcatâ.—*Lindl.*, *Bot. Reg.*, xxviii. *Misc.*, p. 63; *et in Gard. Chron.* (1842) p. 639; *Splitg. in Ann. Sc. Nat.*, Sér. II. xv. (1841) p. 283; *Reichb. f. in Nederl. Kruidk. Arch.*, iv. (1859) p. 321; *De Vriese in Belg. Hort.*, vi. (1856) pp. 313, 374, t. 76, fig. 10; *Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 152 (partim).

Epidendrum palmarum, *Salzm. ex Lindl.*, *Gen. and Sp. Orch.*, p. 436.

Hab. Brazil and Guiana. Bahia, on palm stems, *Salzmann*! Between Maçeio and Alagoas, on palm stems, *Gardner*, 1419! Pernambuco, at Caxanga, Monteiro, and Macacos, common, *Ridley, Lea, and Ramage*! Surinam, *Splitgerber*, 409.

Folia $1\frac{1}{4}$–3 poll. longa, 1–$1\frac{1}{2}$ poll. lata. Racemi $\frac{1}{2}$–2 poll. longi. Bracteæ 2–5 lin. longæ. Pedicelli $\frac{3}{4}$ poll. longi. Sepala et petala $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longa. Columna $1\frac{1}{4}$ poll. longa. Capsula $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longa.

Readily distinguished from the preceding, which has been confused with it, by its terminal inflorescence and very short fruit, which is very distinctly calyculate. There is no clear evidence that this species grows in the West Indies, for all the so-called West Indian specimens which I have seen belong to the preceding.

10. VANILLA AFRICANA, *Lindl. in Journ. Linn. Soc.* (*Bot.*) vi. (1862) p. 137; caule gracili alte scandente; foliis petiolatis oblongo-lanceolatis acuminatis; bracteis ovatis acutis; labello trilobo, lobis lateralibus rotundato-oblongis obtusis denticulatis, lobo intermedio deltoideo-ovato acuto; disco medio

cristatâ, infra medium carinam papillosam ad basin extensâ, ramentaceâ ornato, columnâ brevi.

Hab. W. Trop. Africa, *Loddiges!* Brass, Niger Territory, *Barter*, 47! Mt. John, Kongui River, *Mann*, 1881!

Folia 2–5 poll. longa, ½–1¼ poll. lata. Racemi ¾ poll. longi. Sepala et petala non visa. Bracteæ 1½ lin. longæ. Labellum 8 lin. longum. Columna ½ poll. longa.

This species is very remarkable in the shape of the lip; Lindley, who received a flowering branch from Loddiges, unfortunately did not preserve the sepals and petals, though he both sketched and carefully dried the lip and column. No other specimens are in flower, but they appear to belong to the same species.

11. V. ACUMINATA, *Rolfe;* caule subgracili; foliis petiolatis lanceolatis vel oblongo-lanceolatis acuminatis; racemis brevibus, bracteis ovato-oblongis subobtusis; sepalo postico lanceolato, sepalis lateralibus lanceolato-oblongis; petalis falcato-lanceolatis omnibus acutis; labello profunde trilobo, lobis lateralibus rotundato-oblongis obtusis, lobo intermedio oblongo obtuso apiculato; disco medio ramentaceo vix cristato; columnâ clavatâ.

Hab. W. Trop. Africa. Gabon, in the province of Munda, *Soyaux*, 134. "Frequent in woods, but seldom flowers."

Folia 6–7 poll. longa, 1–1¼ poll. lata; petiolus ¾ poll. longus. Racemus 1 poll. longus. Bracteæ 1½–4 lin. longæ. Sepalum posticum 10–12 lin. longum, 3 lin. latum; sepala lateralia 4 lin. lata. Petala 9–10 lin. longa, 2½ lin. lata. Labellum 7–8 lin. longum. Columna 6–7 lin. longa.

Allied to the preceding species, but the stem stouter, leaves and bracts longer, and the lip quite differently shaped. The crest is unusually small, being reduced to a few scaly appendages.

12. V. CUCULLATA, *Kraenzl. in Mittheil. deutsch. Schutzg.*, ii. (1889) [Reprint, p. 8]; foliis oblongis acuminatis basi oblique cordatis brevi-petiolatis; rhachi crassiusculâ rarius basi ramosa, bracteis squamiformibus triangularibus; sepalis lateralibus ovatis subobliquis, sepalo intermedio oblongo recto quam lateralia paullo breviore; petalis subconformibus; labello ovato fere triangulari acuto; disco seriebus 2 linearibus

laminarum instructo, lamellis laminæ appressis laciniatis, laciniis hyalinis reflexis; columnâ curvatâ cum basi labelli coalitâ.

Hab. W. Trop. Africa, South Cameroons, *Braun*, 4.

Folia 4–6 poll. longa, $1\frac{1}{4}$–$2\frac{1}{4}$ poll. lata. Flos 1 poll. longus.

Apparently allied to the preceding, but the lip not nearly so much united to the column, and seemingly different in shape.

13. VANILLA RAMOSA, *Rolfe;* caule subgracili; foliis petiolatis oblongis vel elliptico-oblongis breviter acuminatis subobtusis; racemis subbrevibus sæpe parce ramosis, bracteis ovatis subobtusis; sepalis petalisque oblongo-lanceolatis subacutis subæqualibus; labello profunde trilobo, lobis lateralibus transverse oblongis, lobo intermedio oblongo subacuto margine crenulato reflexo-plicato, cristâ foliolis ramentaceis composita; columnâ clavatâ.

Vanilla, sp., *Lindl. in Journ. Linn. Soc.* (*Bot.*), vi. (1862) p. 137.

Hab. W. Trop. Africa. Niger, about Angiama, abundant, *Barter*, 20134! Interior of Western Lagos, *Rowland!*

Folia 4–6 poll. longa, 1–$2\frac{1}{4}$ poll. lata; petiolus $\frac{1}{2}$–$\frac{3}{4}$ poll. longus. Racemi $1\frac{1}{2}$–2 poll. longi. Bracteæ 1–2 lin. longæ. Sepala et petala 10–12 lin. longa. Labellum 7–8 lin. longum. Columna 7–8 lin. longa. Capsula non visa.

This differs from the two preceding species in its much broader leaves, and in the details of the flower. The branched inflorescence is remarkable. Nothing is known about the fruit.

14. V. OVALIFOLIA, *Rolfe;* caule gracili; foliis petiolatis late ellipticis breviter et abrupte acuminatis subobtusis; racemis subbrevibus, rhachi compressiusculo; bracteis triangulo-ovatis subacutis brevibus; sepalis petalisque lanceolato-oblongis subobtusis paullo inæqualibus; labello profunde trilobo, lobis lateralibus rotundato-oblongis obtusis, lobo intermedio oblongo crenulato subobtuso, nervo medio incrassato; cristâ foliolis ramentaceis latis compositâ; columnâ clavatâ.

Hab. W. Trop. Africa. Old Calabar, *Thomson*, 132!

Folia 3–$3\frac{1}{2}$ poll. longa, $1\frac{3}{4}$–2 poll. lata; petiolus 4–6 lin. longus. Racemi $1\frac{1}{2}$–2 poll. longi. Bracteæ 1 lin. longæ.

Pedicelli $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longi. Sepala et petala 8–9 lin. longa. Labellum 7–8 lin. longum. Columna 6–7 lin. longa. Capsula ignota.

Readily distinguished from the preceding by its very short broad leaves, and different floral structure.

15. VANILLA GRIFFITHII, *Reichb. f. in Bonplandia*, ii. (1854) p. 88; foliis elliptico-oblongis vel rarius lanceolato-oblongis cuspidatis; racemis brevibus subcorymbosis, bracteis ovatis vel ovato-oblongis subacutis; sepalis petalisque elliptico-oblongis obtusis; labello trilobo, lobis lateralibus rotundatis obtusis, lobo intermedio transverse oblongo vel suborbiculari emarginato lateribus plicatis hirsutis, cristâ globosâ villosissimâ; columnâ brevi; capsulis lineari-oblongis. *Rolfe, in Orch. Rev.*, iii. (1895) p. 69.

Vanilla sp., *Griff., Notul.*, iii. p. 247, *Ic. Pl. Asiat.*, t. 281.

V. albida, *Hook. f., Fl. Brit. Ind.*, vi. p. 91, in part (*not of Blume*). V. tolypephora, *Ridl. in Trans. Linn. Soc.*, Ser. ii. (*Bot.*) iii. (1893) p. 376.

Hab. India. Malacca, *Griffith! Maingay!* Penang, *Wallich! Curtis*, 1167! Perak, *Scortechini! Wray! King's Collector!* Singapore, *Lobb!* At Changi, *Ridley*, 3924! Pulau Ubin and Selangor, *Ridley*.

Planta 40–60 ped. alta. Folia 3–$7\frac{1}{2}$ poll. longa, $1\frac{1}{4}$–$3\frac{1}{4}$ poll. lata. Racemi $1\frac{1}{4}$–$2\frac{1}{2}$ poll. longi. Bracteæ $2\frac{1}{2}$–5 lin. longæ. Pedicelli $\frac{3}{4}$–$1\frac{1}{4}$ poll. longi. Sepala et petala 10–15 lin. longa. Labellum $\frac{3}{4}$–1 poll. longum. Columna $\frac{1}{2}$ poll. longa. Capsula $2\frac{1}{2}$–3 poll. longa.

This is said to be the common species all over the Malay Peninsula, the stems growing 40 to 60 feet long, the flowers waxy white or cream colour, with the lip pinkish inside, and the fruit yellow when ripe, sweet and eatable, like a small banana. The crest resembles a ball of wool.

A specimen collected at Bankinsing, in the Island of Formosa, by Dr. A. Henry (n. 479), has the inflorescence and bracts remarkably like Curtis n. 1179 from Penang, but the leaves are smaller, and whether it represents a distinct species or otherwise cannot, in the absence of the flowers, be determined.

16. V. GRANDIFOLIA, *Lindl. in Journ. Linn. Soc.* (*Bot.*) vi. (1862) p. 138; foliis petiolatis late ellipticis vel suborbicularibus breviter et abrupte acuminatis obtusis; bracteis ovato-

oblongis obtusis; sepalis petalisque oblongo-lanceolatis obtusis; labello subintegro (?) undulato, disci nervis superne crassiusculis, cristâ appendicibus capillaribus compositâ; capsulis crassiusculis elongatis.

Hab. W. Trop. Africa. Prince's Island, *Barter*, n. 1981! *Monteiro! Henriques!*

Folia 6–8 poll. longa, 4–5 poll. lata. Racemi 4 poll. longi. Bracteæ 6 lin. longæ. Pedicelli 2½ poll. longi. Sepala et petala 2¼ poll. longa. Labellum 2 poll. longum. Columna 1¼ poll. longa. Rostellum 5 lin. longum. Capsula 6–10 lin. longa.

A very distinct species, characterized by its broad leaves, stout raceme of large flowers, and long fruit. The lip of the only flower seen is somewhat broken in front, so that its exact shape cannot be made out.

17. VANILLA PHILIPPINENSIS, *Rolfe;* foliis elliptico-oblongis breviter acuminatis; racemis paullo elongatis multifloris, bracteis ovato-oblongis obtusis concavis; sepalis petalisque oblongo-lanceolatis subobtusis; labello trilobo, lobis lateralibus amplis apice obtusis, lobo intermedio oblongo obtuso villosissimo, disco medio villosissimo; columnâ clavatâ; capsulâ oblongâ.

Hab. Philippine Islands; without precise locality; *Cuming*, 2132.

Folia 6–9 poll. longa, 1¾–2¾ poll. lata. Racemi 6 poll. longi. Bracteæ 2–5 lin. longæ. Pedicelli 1½–2 poll. longi. Sepala et petala 1¾ poll. longa. Labellum 1½ poll. longum. Columna 1 poll. longa. Capsula 2½ poll. longa, ¾ poll. lata.

A very distinct species, well characterized by its long raceme, the very villose front lobe of the lip, and the short stout fruit.

18. V. ALBIDA, *Blume, Cat. Gew. Buitenz.* (1823) p. 100; foliis petiolatis lanceolatis vel ovato-lanceolatis acuminatis; racemis 6-multifloris, bracteis late ovatis obtusis concavis; sepalis petalisque oblongo-lanceolatis acutis; labello integro margine reflexo plicato; disco lineâ mediâ carnoso apice hirsuto, cristâ parvâ villosâ subglobosâ; capsulis lineari-oblongis. *Blume, Bijdr.*, p. 422, t. 43, *et Rumphia*, i. p. 197, t. 67; *Miq., Fl. Ned. Ind.*, iii. p. 719; *Reichb. f. in Bonplandia*, v. (1857) p. 37 (*non Hook. f.*).

Hab. Java, in damp woods and on the mountains, *Blume*, *Horsfield!* Lampong, *Zollinger*, 961. Borneo, Kuching, *Haviland!*

Planta 20–30 ped. alta. Folia 4–6 poll. longa, 1–1¾ poll. lata. Racemi 1–1½ poll. longi. Bracteæ 1½–2 poll. longæ. Sepala et petala 1¼–1¾ poll. longa. Labellum 1¼–1½ poll. longum. Columna ¾ poll. longa. Capsula 5–6 poll. longa, ¾ poll. lata.

I have only seen a fruiting specimen from Borneo, which has more numerous bracts than in Blume's original figure, though in other respects it agrees well with it. It is very distinct from *V. Griffithii*, Reichb. f., which has been confused with it. The fruit appears not to be aromatic.

19. **VANILLA BORNEENSIS**, *Rolfe;* caule crassiusculo flexuoso; foliis petiolatis oblongis vel elliptico-oblongis, acuminatis; racemis brevibus flexuosis paucifloris, bracteis ovatis vel triangulari-ovatis acutis; capsulis elongato-linearibus.

Hab. Borneo, at Banjarmassing, *Motley*, 1248!

Internodi 2½–4 poll. longi. Folia 4–6 poll. longa, 1–2 poll. lata; petioli 4–6 lin. longi. Racemi 1–1½ poll. longi. Bracteæ 2–3 lin. longæ. Capsula 3–3½ poll. longa.

Readily distinguished from its allies by its lax, few-flowered racemes.

A sketch of a flower and leaf, made by Mr. F. W. Burbidge, and preserved at the British Museum together with a piece of the stem, may belong here, both the leaf and the habitat being substantially identical. The sepals and petals are oblong and obtuse, and the lip has largish rounded side lobes, a short, broad, front lobe, and five verrucose keels near the front. The details of the central crest are not clearly indicated. It is labelled Tawaran and Tampasuk Rivers, N.-W. Borneo. Flowers large, waxy white and brown. Fruit not seen. Grows on trees near wet rocks by river side.

20. **V. PALEMBANICA**, *Teysm. et Binn. in Tijdschr. Nederl. Ind.*, xxix (1867) p. 243; foliis petiolatis ovatis acuminatis, basi rotundatis obsolete venosis; spicis 6–8-floris bifariis, bracteis parvis ovatis squamiformibus; sepalis ovalis obtusis carnosulis convexiusculis levibus; petalis similibus late carinatis; labelli tubo ventricoso limbo retuso undulato barbato; columnâ glabrâ; capsulis obsolete triquetris rectiusculis.

Hab. Sumatra, in prov. Palembang, *Teysman.*

Folia $3\frac{1}{2}$ poll. longa, $1\frac{3}{4}$ poll. lata. Capsulæ 4 poll. longæ.

Only known by the original description, according to which the sepals and petals are whitish-green, the lip lined with lilac in the tube and with pale reddish hairs, and the column white with some orange spots at the base.

21. VANILLA MOONII, *Thw.*, *Enum. Pl. Zeyl.* (1861) p. 312; habitu *V. planifoliæ;* foliis et racemis brevioribus; bracteis ovatis subacutis; sepalis petalisque lanceolato-oblongis subobtusis; labello subintegro paullo undulato, apice reflexo; disci nervis superne corrugatis papillosis; cristâ hirsutâ reflexâ; capsulis lineari-oblongis. *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 90.

Hab. Ceylon, Negumbo and Kornegalle, *Thwaites*, 3204! Galle, *Champion!* Without locality, *Gardner! Mrs. Walker!*

Folia $3\frac{1}{2}$–5 poll. longa, 1–$1\frac{3}{4}$ poll. lata. Racemi $1\frac{1}{2}$–2 poll. longi. Bracteæ $1\frac{1}{2}$ poll. longæ. Pedicelli $\frac{3}{4}$–1 poll. longi. Sepala et petala $1\frac{1}{4}$ poll. longa. Labellum 1 poll. longum. Capsula 4 poll. longa, 7–9 lin. lata.

Not unlike a reduced edition of *V. planifolia*, but smaller in all its parts, and the fruits much shorter and stouter. There is no record as to whether its possesses any aromatic properties. A drawing by Mrs. Walker shows the sepals and petals dusky yellow and the lip light yellow with brown papillæ in front.

A specimen in Wight's Herbarium labelled "Hab. — ? Peninsula ?" looks somewhat different, but is too imperfect for certain determination.

22. V. SPRUCEI, *Rolfe;* caule gracili flexuosis; foliis petiolatis lanceolatis vel oblongo-lanceolatis acuminatis subobtusis; racemis axillaribus brevibus paucifloris; bracteis oblongis subobtusis; sepalis petalisque lineari-lanceolatis acutis, basi angustis; labello columnæ longe adnato basi anguste tubuloso, apice paullo ampliato integro subobtuso undulato; disco ruguloso medio cristato, crista oblonga, foliolis ramentaceis denticulatis compositâ; columnâ elongato-clavatâ.

Hab. Columbia, in shady woods near the Uaupés River, on the Upper Amazon, *Spruce*, 2727!

Folia 4–$4\frac{1}{2}$ poll. longa, 1–$1\frac{1}{2}$ poll. lata; petiolus 5–6 lin. latus. Racemus $\frac{3}{4}$ poll. longus. Bracteæ 2–4 lin. longæ. Sepala et petala $2\frac{1}{4}$–$2\frac{1}{2}$ poll. longa, $2\frac{1}{2}$–3 lin. lata. Labellum $2\frac{1}{4}$ poll. longum. Columna $1\frac{3}{4}$ poll. longa. Capsula ignota.

Remarkable for its broadly lanceolate leaves and long, narrow perianth segments. The specimen is not in very good state, and the fruit is unknown. Spruce records the flowers as whitish-green.

23. VANILLA HAMATA, *Klotzsch, in Bot. Zeit.*, iv. (1846) p. 563; foliis breviter petiolatis late ellipticis vel obovato-ellipticis, apiculatis apiculo recurvo; sepalis et petalis oblongo-lanceolatis subobtusis; labello subintegro obtuso crispo-undulato, cristâ appendicibus fimbriatis compositâ; disci nervis ternis superne carinatis crenulatis.

Hab. Peru, *Ruiz et Pavon!*

Caules (sicci) 4 lin. lati; internodi 4–4½ poll. longi. Folia 5½–6 poll. longa, 3½ poll. lata. Sepala et petala 3 poll. longa. Labellum 2 poll. longum. Columna 1¼ poll. longa.

Very distinct from every other species in the shape of the leaves, but nothing is known about the inflorescence and fruit. Humboldt speaks of a *Vanilla* in the province of Jaen, on the Upper Amazon, Perù, with aromatic fruits (Voy. Humb. et Bonpl., pte. 3, vol. ii. p. 437), but whether it belongs to the present species, to *V. hamata*, Klotzsch, or to some unknown Peruvian species, there is no means of knowing. It was described from a barren specimen, but a piece from Pavon at the British Museum (hitherto unidentified) enables the details of the flower to be added.

24. V. HOSTMANNI, *Rolfe;* caulibus crassiusculis; foliis breviter petiolatis lanceolato-oblongis, breviter acuminatis subobtusis; racemis crassiusculis subelongatis multifloris, bracteis oblongis obtusis vel subacutis concavis; sepalis petalisque lanceolatis subobtusis; labello oblongo subintegro obtuso; disco basi pubescente, cristâ retrorsim hirsutâ; columnâ clavatâ.

Hab. Surinam, *Hostman*, 306!

Folia 5½–9 poll. longa, 1½–2¾ poll. lata. Racemi 2–3 poll. longi. Bracteæ 3–5 lin. longæ. Pedicelli 1¼ poll. longi. Sepala et petala 2¼–2¾ poll. longa. Labellum 1¾–2 poll. longum. Columna 1¼ poll. longa. Capsula ignota.

In the absence of fruit the exact affinity of this species is a little doubtful. The inflorescence and bracts would place it near *V. planifolia*, though the disc of the lip is not corrugated in front, as in that species. The leaf is also distinctly broader in the middle than elsewhere, as is often the case with *V. Pompona*, which is very different in other respects.

25. VANILLA PLANIFOLIA, *Andr.*, *Bot. Rep.*, viii. (1808) t. 538; alte scandente, caulibus succulentis subflexuosis; radicibus flexuosis oppositifoliis; foliis subsessilibus oblongis acutis vel breviter acuminatis carnulosis; bracteis oblongis subacutis vel obtusis concavis; floribus pallide viridibus; sepalis petalisque lineari-oblongis subobtusis; labello convoluto marginibus columnæ longe adnatis, apice subtrilobo retuso margine revoluto; disci nervis crenulato-verrucosis, cristâ penicillatâ retrorsâ; columnâ facie villosâ; capsulis elongato-linearibus obscure trigonis.—*R. Br. in Ait. Hort. Kew*, ed. II. v. p. 220; *Lodd.*, *Bot. Cab.*, viii. t. 733; *Bauer, Ill. Orch.*, *Gen.*, tt. 10, 11; *Blume*, *Rumphia*, i. p. 197, t. 68, fig. 2; *Lindl.*, *Gen. and Sp. Orch.*, p. 435; *C. Morr. in Ann. Nat. Hist.*, Ser. I. iii. (1839) p. 1; *De Vriese in Belg. Hort.*, vi, pp. 315, 365; *Bentley and Trim. Medic. Pl.*, iv. t. 272 (excl. syn.); *Flueck. and Hanb. Pharmacogr.*, p. 595; *Gard. Chron.* (1867) p. 997; N.S. xvi. (1881) p. 562; *Bot. Mag.*, t. 7167; *Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 145; *Rolfe, in Kew Bull.* (1895) pp. 169–176.

Epidendrum Vanilla, *Linn.*, *Sp. Pl.*, ed. I. p. 952 (partim).

Vanilla mexicana, *Mill.*, *Gard. Dict.*, ed. 8 (1768), n. 1 (partim). V. aromatica, *Sw. in Nov. Act. Soc. Sc. Upsal.*, vi. (1799) p. 66; *et in Schrad. Journ.*, ii. p. 208 (partim). *Lindl.*, *Gen. and Sp. Orch.*, p. 434 (partim). V. Epidendrum, *Mirb.*, *Hist. Pl.*, ed. II. ix. p. 249 (partim). V. viridiflora, *Blume*, *Bijdr.*, p. 422. V. sativa, *Schiede*, *in Linnæa*, iv. (1829) p. 573; vi. (1831) p. 59. *Lindl.*, *Gen. and Sp. Orch.*, p. 437. V. sylvestris, *Schiede*, *ll.cc.*; *Lindl.*, *l.c.* V. majaijensis, *Blanco*, *Fl. Filip.*, ed. II. p. 593.

Myobroma fragrans, *Salisb.*, *Parad. Lond.*, t. 82.

Hab. South-Eastern Mexico, in the Vera Cruz district, *Dampier*, *Humboldt*, *Schiede*. Misantla, *Schiede!* Yucatan, *Schott*, 215! British Honduras, *Morris*. Guatemala, *Lehmann*, 1436! Costa Rica, *Dampier*. Cultivated in the Mascarene Islands, Java, the West Indies, and other parts of the tropics.

Folia 4–9 poll. longa, 1½–2½ poll. lata. Racemi 2–3 poll. longi. Bracteæ 2–6 lin. longæ. Pedicelli 1½–2 poll. longi. Sepala et petala 2 poll. longa. Labellum paullo ultra 2 poll. longum. Columna 1⅛–1¼ poll. longa. Capsula 6–9 poll. longa, 6–7 lin. lata.

This species produces the true Mexican Vanilla of commerce,

which has been known ever since the discovery of America by the Spaniards, and was described by Clusius as long ago as 1605, as mentioned on p. 439. Its early history is much confused, as for a long period three or four species were confounded together, and even when the present one was described it was not known as the source of the Vanilla of commerce, which was then, and for long afterwards, thought to be *V. aromatica*, Sw. (*i.e.*, *V. inodora*, Schiede). The collection can be directly traced from the Paddington Garden in 1807, as mentioned on p. 440, to various continental gardens, to Java (where Blume re-described it under the name of *V. viridiflora*), and to Réunion—thus originating the present industry in that island. *Myobroma fragrans*, Salisb., was drawn from the same individual as the original *Vanilla planifolia*, Andr. *V. sativa* and *V. sylvestris* of Schiede are only known from the original descriptions, but are evidently forms of the same species, differing only a little in the length of the fruit, the former being a cultivated race and the latter the wild original. *V. majaijensis*, Blanco, is also known only from description, and as the fruit is said to be not aromatic a doubt remains as to its identity. Succeeding authors, however, have considered it synonymous with the present one, and if Blanco's fruits were unripe this view may be correct, in which case it seems probable that the species was introduced to the Philippines from Mexico by the Spaniards. Naves (Blanco, 'Fl. Filip.,' ed. III., Nov. App., p. 248) enumerates it as growing in the province of San Mateo, where he had seen flowers and fruit, and a confirmation of the identification seems desirable.

26. VANILLA PHÆANTHA, *Reichb. f. in Flora*, xlviii. (1865), p. 274; habitu *Vanillæ planifoliæ;* bracteis majoribus laxis, late elliptico-oblongis subobtusis; floribus majoribus viridiflavis; labello obscure trilobo fere truncato, nervis non verrucosis; cristâ appendicibus foliaceis denticulatis retrorsis compositâ; labelli basi lineis 2 puberulis instructâ; capsulâ lineari-oblongâ obscure compressâ.—*Rolfe, in Kew Bull.* (1895) p. 176.

V. planifolia, *Griseb., Fl. Brit. W. Ind.*, p. 638, in part (*non Andr.*). V. planifolia *β*. macrantha, *Griseb., Cat. Pl. Cub.*, p. 267.

Hab. West Indies, Cuba, *Wright*, 3351, in part! St.

Vincent, *Guilding!* In virgin forest between Mt. St. Andrews and the Grand Bonhomme, at 2,000 feet alt., *Smith!* Trinidad, *Hart!*

Folia 3–7 poll. longa, $\frac{3}{4}$–2 poll. lata. Racemi $1\frac{1}{4}$–2 poll. longi. Bracteæ 3–7 lin. longæ, 2–4 lin. latæ. Sepala et petala $2\frac{1}{4}$–$2\frac{3}{4}$ poll. longa. Labellum 2–$2\frac{1}{2}$ poll. longum. Capsula 3 poll. longa, $\frac{1}{2}$ poll. lata.

This is an indigenous West Indian species which has been confused with *Vanilla planifolia*, Andr., though it is easily distinguished by its much larger flowers, lip without verrucose disc, and its much shorter fruit. Mr. Hart states that it is indigenous in Trinidad, and that the fruit has little perfume, and Messrs. Smith remark that in St. Vincent they only observed it in a limited space but in virgin forest. It is cultivated in the Botanic Gardens of Jamaica and Trinidad, but there is no evidence of its fruits being of any commercial value. Wright's Cuban specimen at Kew, and also at the British Museum, is mixed with the leafless *V. barbellata*, Reichb. f., a fruiting specimen of each being attached to the same sheet, with a single ticket.

27. VANILLA POMPONA, *Schiede, in Linnæa*, iv. (1829) p. 573; habitu *Vanillæ planifoliæ;* foliis majoribus; bracteis majoribus late elliptico-oblongis; floribus majoribus carnosiusculis viridiflavis; labello subintegro, venis paullulo crassiusculis, cristâ appendicibus foliaceis retrorsis compositâ; capsulis lineari-oblongis obtuse trigonis.—*Lindl., Gen. and Sp. Orch.*, p. 437; *Klotzsch, in Bot. Zeit.*, iv. (1846) p. 566; *Desv. in Ann. Sc. Nat.*, sér. III. vi. (1846) p. 120; *Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 147; *Rolfe, in Kew Bull.* (1895) p. 176.

V. grandiflora, *Lindl., Gen. and Sp. Orch.*, (1840) p. 435. V. guianensis, *Splitg. in Ann. Sc. Nat.*, sér. II. xv. (1841) p. 279 (partim). *De Vriese in Tuinb. Fl.*, iii. (1856) pp. 78, 81, t. 6 (partim). *Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 151 (partim). V. surinamensis, *Reichb. f. in Nederl. Kruidk. Arch.*, iv. (1859) p. 321 (partim). V. lutescens, *Moq. ex Dupuis, in Rev. Hort.*, sér. IV, v. (1856) p. 121 fig. 24; *Bull. Soc. Bot. Fr.*, iii. (1856) p. 354; *Duchartre, in Journ. Soc. Imp. Hort.*, v. (1859) p. 97, t. 11; *Fl. des Serres*, xxi. t. 2218.

Hab. S. E. Mexico, Papantla and Colipa, *Schiede!* Valley of Cordova, *Bourgeau*, 2332! Nicaragua, Segovia, *Oersted!*

Panama, *Seemann*, 1159! Columbia, Lower Mountains of Santa Martha, *Purdie!* Tolima, bei La Plata, 800–1500 m. alt.; *Lehmann*, 2263! Venezuela, at La Guayra, Trinidad, *Bradford*, 5285! *Hart!* British Guiana, Corentyne River, *im Thurn.* Surinam, *Merian.* Cayenne, *Aublet.*—Cultivated in Martinique, Guadeloupe, and possibly other localities.

Folia 6–11 poll. longa, $1\frac{1}{2}$–$4\frac{1}{2}$ poll. lata. Racemi $1\frac{1}{4}$–2 poll. longi. Bracteæ 5–7 lin. longæ, 3–4 lin. latæ. Sepala et petala 3–$3\frac{1}{2}$ poll. longa. Labellum $2\frac{1}{2}$–3 poll. longum. Capsula 4–7 poll. longa, $\frac{3}{4}$–1 poll. lata.

This species is much more widely diffused than *Vanilla planifolia*, and its fruit has long been known as an article of commerce, being now usually sold under the name of West Indian Vanillons. It is the Grosse Vanille of Aublet, the Baynilla de acguales of Humboldt, and the Baynilla Pompona of Schiede. The pods are much thicker and more fleshy than those of *V. planifolia*, and more difficult to dry. They also fetch a much lower price in the market, but the fresh fruits are largely used in the same way as those of *V. planifolia.*

28. VANILLA GARDNERI, *Rolfe, in Kew Bull.* (1895) p. 177; caulibus crassiusculis; foliis subsessilibus oblongis obtusis crassiusculis; racemis crassiusculis brevibus, bracteis ovatis obtusis rigidis patentibus; sepalis petalisque lineari-lanceolatis subobtusis; labello oblongo subintegro obtuso submembranaceo, nervo vix incrassato; disco subpubescente cristato; columnâ clavata.

Vanilla planifolia, *Gardn. in Hook., Lond. Journ. Bot.*, i. (1842) p. 542 (*non Andr.*); *Travels in Brazil*, ed. II. p. 225.

Hab. Brazil, in dry rocky, bushy places, common, as on the Morra do Flamengo, near Rio, *Gardner*, 245! In moist places in the district of Parnagua, prov. Piauhy, *Gardner*, 2733! Natividade, prov. Goyaz, *Gardner*, 3449! Pernambuco, at Iguarassa, *Ridley, Lea and Ramage!* *Burchell*, 894 from near Rio, and 9829 from San José da Laranjeira, Pará, may represent barren branches of the same; the latter is marked as "*Bahunilha.* Fructus teres, 4–5 poll."

Folia 3–5 poll. longa, $1\frac{1}{4}$–$1\frac{1}{2}$ poll. lata. Racemi $1\frac{1}{2}$–3 poll. longi. Bracteæ 3–5 lin. longæ. Pedicelli $\frac{3}{4}$–$1\frac{1}{2}$ poll. longi. Sepala et petala $2\frac{3}{4}$ poll. longa. Labellum $2\frac{1}{2}$ poll. longum. Columna $1\frac{1}{2}$ poll. longa. Capsula ignota.

A species allied to *Vanilla Pompona*, Schiede, but with leaves about half the size, longer racemes with smaller, not reflexed bracts, and rather smaller, more membranaceous flowers. Gardner confounded it with *V. planifolia*, Andr., and remarked: "This is the plant which yields the Vanilla (Banilha of the Brazilians) in Brazil" (in *Hook., Lond. Journ. Bot.*, i. (1842) p. 542), though unfortunately his specimens are without fruit. There are pods in the museum labelled "Brazilian or Bahia Vanilla," which are 5½ inches long by fully 1 inch broad, fleshy, and distinctly triquetrous, and thus approaching those of *V. Pompona*, but with a rank odour. These are probably produced by the present species. "South American Vanilla" (cf *Kew Bull.* (1892) p. 214) may also have the same origin. They are described as from 6½ to 7½ inches long, quite broad and flattened, ½ inch or more wide, reddish-brown, and the odour rank, somewhat resembling fermented molasses or rum. As much as 9,000 lbs. of the "beans" are said to have been produced in 1891, and it is suggested that it is most likely used as an adulterant of the Mexican cut beans. Flowering and fruit specimens of the commercial plant are required to settle these doubtful points.

29. VANILLA VELLOZII, *Rolfe;* caulibus crassiusculis; foliis subsessilibus oblongis obtusis crassiusculis, margine subrevolutis; racemis crassiusculis brevibus, bracteis ovato-oblongis obtusis rigidis; floribus albido-luteis; sepalis petalisque lineari-lanceolatis subobtusis; labello oblongo subtrilobo emarginato undulato, nervo medio supra cristam incrassato, dein ad basin pubescente; columnâ clavatâ.

Epidendrum Vanilla, *Vell., Fl. Flum.*, ix. (1827) p. 4, t. 1; *Netto, in Arch. Mus. Nac., Rio de Janeiro*, v. (1881) p. 356 (*non Linn.*).

Vanilla Chamissonis, var. *β*, *Cogn. in Mart. Fl. Bras.*, iii. pars IV. (1894) p. 149.

Hab. Brazil, arenosis locis ad littora maris, *Vellozo.* In prov. Rio de Janeiro, *Gaudichaud*, 385; *Riedel.* Ad Copacabana, sur le bord de la mer, *Glaziou*, 11621! 14302! In prov. Parà, *Sieber.* Flowers December to January.

Folia 4–5½ poll. longa, 1¼–1¾ poll. lata. Racemi 2½–3 poll. longi. Bracteæ 3–4 lin. longæ. Pedicelli 1–1½ poll. longi. Sepala et petala 1¾–2 poll. longa. Labellum 1¾–2 poll. longum. Columna 1¼–1½ poll. longa. Capsula ignota.

This species has been much misunderstood. It was originally identified with *Epidendrum Vanilla*, Linn. (= *Vanilla inodora*, Schiede); then Klotzsch referred it to *V. palmarum*, Salzm., and finally, Professor Cogniaux doubtfully placed it as a variety of *V. Chamissonis*, Klotzsch (to which latter he refers Glaziou, 14302, though the Kew specimen is certainly the present one). That species, however, has narrower and much longer leaves, and narrower sepals and petals which are shorter than the lip. Although figured as long ago as 1827 we are still without any knowledge of the fruit, and consequently it is impossible to say whether any of the Vanillas of commerce are derived from it, which, however, seems unlikely.

30. VANILLA CARINATA, *Rolfe;* foliis subsessilibus oblongis subobtusis; racemis crassis brevibus, bracteis late ovatis obtusis patentibus; sepalis petalisque lanceolato-oblongis obtusis; labello subtrilobo obtuso subcoriaceo medio carinato, disco glabro cristato; columnâ clavatâ.

Hab. Organ Mountains, Brazil, *Miers!*

Folia 5–6 poll. longa, 1½–2 poll. lata. Racemus 2 poll. longus. Bracteæ 2½–3½ lin. longæ. Pedicelli 1½–1¾ poll. longi. Sepala et petala 2–2¼ poll. longa. Labellum 1¾ poll. longum. Columna 1½ poll. longa.

This species is rather imperfectly known, but is distinct from every other in having a strong keel down the centre of the lip, in front of the crest. The inflorescence is fully twice as stout as in the preceding species, and the bracts much smaller and quite different in shape. The succeeding one, besides wanting the characteristic keel, has the lip more distinctly 3-lobed, the margin undulate, and the central line behind the crest much more pubescent.

31. V. COLUMBIANA, *Rolfe;* caulibus crassis; foliis sessilibus oblongis obtusis crassiusculis; racemis brevibus subgracilibus; bracteis late ovato-oblongis obtusis striatis; sepalis petalisque lanceolatis acutis carnosulis; labello obovato-oblongo trilobo lobis lateralibus latis apice rotundato-obtusis intermedio late quadrato apice obcordato-bilobo apiculato lateribus plicato-undulato; disci venis crassiusculis corrugatis, cristâ lamellatâ deflexâ; columnâ clavatâ, capsulâ ignotâ.

Hab. New Granada, Valley of the Magdalena, *Goudot.* Flowers in February.

Caules 4–6 lin. lati; internodi 6 poll. longi. Folia 4½ poll.

longa, $1\frac{1}{2}$ poll. lata. Racemi $1\frac{1}{4}$ poll. longi. Bracteæ 3–5 lin. longæ. Pedicelli 1 poll. longi. Sepala et petala $1\frac{1}{2}$ poll. longa. Labellum $1\frac{1}{4}$ poll. longum. Columna 1 poll. longa.

A remarkably distinct species, characterized by its strongly three-lobed lip, and other details. It is described from a single specimen, in which the leaves are much shorter than the internodes, which, however, may not hold good when more materials can be examined.

32. Vanilla bicolor, *Lindl.*, *Bot. Reg.*, xxiv. (1838) *Misc.*, p. 37; foliis ovato-oblongis subsessilibus acutis striatis margine rubescentibus; sepalis lineari-lanceolatis acutis patentibus dorso rotundatis; petalis conformibus dorso carinatis; labello membranaceo semilibero convoluto venis ramentaceis medio dense ramentaceo-stuposo; columnâ barbatâ, auriculis crenulatis.

Hab. British Guiana, *Schomburgk*.

Sepala et petala $1\frac{3}{4}$–2 poll. longa. Labellum $2\frac{1}{2}$ poll. longum.

I only know this species by description and a coloured sketch of a flower with dissections in Lindley's Herbarium. The sepals and petals are dull reddish, and the lip cream colour. It flowered with Messrs. Loddiges in 1838, and Lindley states that the flowers are deliciously fragrant, but he apparently neglected to dry the specimen. Nothing is known about the fruit.

33. V. appendiculata, *Rolfe*, *in Kew Bull.* (1895) p. 178; caulibus crassiusculis; foliis breviter petiolatis oblongis v. elliptico-oblongis breviter et abrupte acuminatis subobtusis; racemis crassiusculis brevibus, bracteis oblongis obtusis, sepalis petalisque lanceolato-linearibus acutis; labello oblongo subtrilobo, lobis lateralibus obtusis, intermedio anguste oblongo recurvo nervis appendicibus longis linearibus ornato; disco medio appendicibus foliaceis cuneato-obovatis dentatis ornato; capsulâ angustâ elongatâ.

Hab. British Guiana, Corentyne River, *E. F. im Thurn.*

Folia $3\frac{1}{4}$–$4\frac{1}{2}$ poll. longa, 1–$1\frac{1}{2}$ poll. lata. Racemi 1–$1\frac{1}{2}$ poll. longi. Bracteæ 3–6 lin. longæ. Sepala et petala $2\frac{1}{4}$ poll. longa. Labellum 2 poll. longum. Columna $1\frac{1}{2}$ poll. longa. Capsula $4\frac{1}{2}$ poll. longa.

Remarkable for its narrow sepals and petals, and long narrow lip which terminates in a narrow recurved apex covered with linear foliaceous appendages. The specimens were gathered in

1879, and both the fruits have opened, yet they retain a distinct aromatic perfume, though whether the species has any economic value is uncertain.

34. VANILLA CHAMISSONIS, *Klotzsch, in Bot. Zeit.*, iv. (1846) p. 564; habitu *Vanillæ planifoliæ*, caule crassiore; foliis longioribus et angustioribus marginibus revolutis; bracteis oblongis obtusis; sepalis petalisque lineari-lanceolatis; labello anguste oblongo margine crenulato, nervis crassiusculis minute crenulatis, cristâ penicillatâ, tubo basi pubescente.—*Cogn. in Mart. Fl. Bras.*, iii. pars IV. p. 148, t. 32.

Folia 7–9 poll. longa, 1–1⅓ poll. lata. Racemi 3½ poll. longi. Bracteæ 3–5 lin. longæ, 1½–2½ lin. latæ. Sepala et petala 2¼–2½ poll. longa. Labellum 2¾ poll. longum.

Hab. Brazil, in insulâ Santâ Catherinâ, *Chamisso.* S. Brazil, *Eschscholtz.* Environs de Rio Janeiro et d'Ouro Preto, *Glaziou*, 15661!

Easily distinguished from the preceding by its long and narrow leaves, more slender inflorescence and the lip longer than the sepals and petals. The fruit is unknown. *Glaziou*, 14302, cited here by Professor Cogniaux, belongs to *V. Vellozii*, Rolfe.

35. V. RUIZIANA, *Klotzsch, in Bot. Zeit.*, iv. (1846) p. 563; caule crasso; foliis lanceolato-oblongis subacutis breviter petiolatis.

Caulis 3–5 lin. latis; internodis 3–5 poll. longis. Folia 5–7 poll. longa, 1–1½ poll. lata.

Hab. Peru, *Ruiz & Pavon!*

A species with very distinct habit, but nothing is known about the inflorescence or fruit. Humboldt speaks of a Vanilla in the province of Jaen, on the Upper Amazon, Peru, with aromatic fruits (Voy. Humb. et Bonpl., pte. 3, vol. ii. p. 437), but whether it belongs to the present species, to *V. hamata*, Klotzsch (the one other known from Peru), or to some other species, there is no means of determining.

36. V. ENSIFOLIA, *Rolfe, in Kew Bull.* (1892) p. 141; scandens; caulibus elongatis sulcatis lævibus; foliis petiolatis ensiformibus v. elongato-linearibus subattenuatis acutis breviter petiolatis; racemis abbreviatis, floribus subfasciculatis, bracteis lanceolato-ovatis acutis; sepalis lineari-lanceolatis acutis; petalis subsimilibus subfalcatis nervo medio paullo incrassato; labello elliptico-oblongo crenulato.

Hab. New Granada, prov. Cauca, *Goudot!* Patia, *Herb. Pharm. Soc.!*

Folia 4–8 poll. longa, 6–10 poll. lata, petiolus 3–5 lin. longus. Racemi 1½ poll. longi. Bracteæ 2–3 lin. longæ. Sepala et petala 2 poll. longa. Columna 1⅓ poll. longa.

A very distinct species, characterized by its narrow sword-like leaves. The lip of the only examinable flower is imperfect, so that the details of the disc and crest cannot be given. Nothing is known about the fruit.

37. Vanilla odorata, *Presl, Rel. Hænk.* (1830), p. 101; foliis lineari-lanceolatis acutis nervosis brevissime petiolatis; racemis brevibus; capsulis sessilibus lineari-lanceolatis basi et apice attenuatis aromaticis.—*Klotzsch, in Bot. Zeit.*, iv. (1846) p. 563; *Rolfe, in Kew Bull.* (1895) p. 178.

Hab. Ecuador, Guayaquil, *Hænke.*

Folia 5–7 poll. longa, 6–8 lin. lata. Capsula 6–7 poll. longa.

Only known from description. Presl remarks that, although the fruits had been collected thirty-six years, they still retained their aromatic fragrance.

Sect. II. Aphyllæ.—Caules aphyllæ v. folia ad bracteas abortivas reducta.

38. V. claviculata, *Sw. in Nov. Act. Soc. Sc. Upsal.*, vi. (1799) p. 66; caulibus crassis; foliis abortivis oblongo-lanceolatis subobtusis sessilibus; bracteis ovato-oblongis obtusis; sepalis petalisque oblongo-lanceolatis subobtusis, labello integro emarginato undulato, disco levi, cristâ appendicibus foliaceis apice denticulatis compositâ; capsulis lineari-oblongis.—*Sw. in Schrad. Journ.*, ii. p. 209, t. 1, fig. 1; *et. Fl. Ind. occid.*, iii. p. 1515; *Lindl., Gen. and Sp. Orch.*, p. 434; *Griseb., Fl. Brit. W. Ind.*, p. 638.

Cereo affinis scandens planta, &c. *Sloane, Hist. Jam.*, ii. p. 160, t. 224, fig. 3, 4.

Epidendrum claviculatum, *Sw. Prodr.* (1788) p. 120.

Hab. Jamaica, *Swartz! March!*

Internodi 2–4 poll. longi. Folia abortiva ½–1¼ poll. longa. Bracteæ 2–3 lin. longæ. Pedicelli 1¼ lin. longi. Sepala et petala 1½ poll longa. Labellum 1¼ poll. longum. Columna 1 pol. longa. Capsula 5–6 poll. longa.

This species is still very imperfectly known, and has been

confused with the two following ones, as well as with *V. Wrightii*, Reichb. f., of the previous section. It is only known from Jamaica. The scales, or abortive leaves, are probably confined to the flowering branches, as they are not shown in Sloane's figure. Grisebach describes the flower as white, and the lip bearded along the middle, but the latter character was not found in the flower examined.

39. VANILLA BARBELLATA, *Reichb. f. in Flora*, xlviii. (1865) p. 274; caulibus crassis; foliis abortivis lanceolato-linearibus acutis; bracteis ovatis subobtusis; sepalis petalisque oblongo-lanceolatis subobtusis; labello integro emarginato undulato, disco barbellato, cristâ appendicibus foliaceis denticulatis compositis et in nervo medio extensis ornatâ, capsulis elongato-linearibus.

Vanilla claviculata, *Griseb., Cat. Pl. Cub.* (1866) p. 267 (*non Sw.*); *Sauv., Fl. Cub.*, p. 231.

Hab. Cuba, near Monte Verde, *Wright*, 3352! 3351 in part!

Internodi 2–4 poll. longi. Folia abortiva ¾–2 poll. longa. Bracteæ 2–4 lin. longæ. Pedicelli 1¼–1½ poll. longi. Sepala et petala 1½–1¾ poll. longa. Labellum 1½ poll. longum. Columna 1 poll. longa. Capsulæ 4½–5½ poll. longæ.

Readily distinguished from the preceding, with which it has been confused, by the barbellate lip. The sepals and petals are described by Wright as green, and the lip white, with the lower hairs yellow. Wright's number 3351 is mixed with a specimen of *V. phæantha*, Reichb. f., both at Kew and the British Museum.

40. V. EGGERSII, *Rolfe;* caulibus crassis; foliis abortivis oblongo-lanceolatis acuminatis; sepalis petalisque virescentibus; labello albo v. lilacino; capsulis cylindricis.

Vanilla claviculata, *Reichb. f. in Ber. Deutsch. Bot. Gesel.*, III. (1885) p. 275 (*non Sw.*). V. aphylla, *Eggers, in Vidensk. Medd. Kjoebenh.* (1889) p. 21.

Hab. W. Indies. Santo Domingo, Llanos de Rafae, at 200 m. alt., *Eggers*, 1958! St. Thomas, Flaghill, Smith's Bay, *Eggers.* Bahamas, New Providence, *Eggers.* Porto Rico, Sierra de Luquillo, *Eggers.* Prope Maricao in sylvis ad Mt. Alegrillo, *Sintensis*, 517. A specimen collected at Yauco, Porto Rico, by *Garber* (20), with fruits 4–5 inches long, may belong here.

Internodi 5–10 poll. longi. Folia abortiva 2½–3½ poll. longa.

Bracteæ $\frac{1}{4}$–1 poll. longæ. Flores 2 poll. longi. Capsulæ 3 poll. longæ.

This species is very imperfectly described by Eggers, but a barren specimen from him shows it to be allied to the two preceding, though apparently quite distinct. Reichenbach's plant above mentioned, according to the description, also belongs here. The scales, or abortive leaves, are much larger than in any species of the group.

41. VANILLA APHYLLA, *Blume, Bijdr.* (1825) p. 422; caulibus subgracilibus aphyllis; racemis brevibus paucifloris, bracteis fere obsoletis; sepalis petalisque lineari-oblongis subobtusis apice revolutis; labello trilobo, lobis lateralibus oblongis apice rotundatis crenulatis, intermedio oblongo obtuso v. emarginato marginibus reflexis et plicato-undulatis, disco medio lineâ barbatâ erectâ instructo; capsulis elongato-linearibus.—*Blume, Rumphia*, I. p. 198, t. 68; *Lindl., Gen. and Sp. Orch.*, p. 436; *Reichb. f. in Bonplandia*, v. p. 37; *et Otia Bot. Hamb.*, p. 40.

Hab. Java, on shrubs in the alluvial region, *Blume.* Tjikoya, *Zollinger*, 599! In insula Nusa Kambangan, *Blume.*

Internodi 2–4 poll. longi. Pedicelli $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longi. Sepala et petala 1–$1\frac{1}{4}$ poll. longa. Labellum 1–$1\frac{1}{4}$ poll. longum. Columna $\frac{3}{4}$ poll. longa. Capsula 5–6 poll. longa.

The earliest known species of this section, and easily distinguished from *V. Wightiana*, Lindl., which has been confused with it, by the different structure of the flower. According to Blume, the sepals and petals are light green, and the lip lilac-purple.

42. V. PARISHII, *Reichb. f., Otia Bot. Hamb.* (1878), p. 39; racemis brevibus, bracteis late ovato-oblongis obtusis; sepalis petalisque lanceolato-oblongis subacutis; labello trilobo lobis lateralibus oblongis apice rotundatis crenulatis intermedio rotundato-oblongo crenulato, disco medio longe barbato, cristâ appendicibus fimbriatis retrorsis compositâ.—*Hook. f., Fl. Brit. Ind.*, vi. p. 90.

Hab. Tenasserim, *Parish*, 286! Moulmein, *Gilbert.*

Bracteæ $1\frac{1}{2}$ lin. longæ. Pedicelli $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longi. Sepala et petala 1–$1\frac{1}{4}$ poll. longa. Labellum 1–$1\frac{1}{4}$ poll. longum. Columna $\frac{3}{4}$ poll. longa.

A very distinct species, of which an inflorescence only is known. According to a drawing of a single flower sent by

Gilbert, the sepals and petals are reflexed, and the colour pea-green, with a white lip, and a little yellow at the base of the tube.

43. VANILLA CALOPOGON, *Reichb. f.*, *Otia Bot. Hamb.* (1870) p. 40; caulibus crassis; racemis brevibus paucifloris, bracteis ovatis subacutis; sepalis petalisque oblongo-lanceolatis acuminatis; labello trilobo, lobis lateralibus oblongis apice rotundatis undulatis, intermedio late oblongo subacuto, disco longe barbato, cristâ retrorsâ dense barbatâ; capsulis elongato-oblongis.

Hab. Philippines, *Cuming*, 2070!

Internodi 2–4½ poll. longi. Bracteæ 2–3 lin. longæ. Pedicelli 1½–2 poll. longi. Labellum 1½ poll. longum. Columna ¾ poll. longa. Capsula 4½ poll. longa.

Easily distinguished from the preceding species by its more acuminate sepals and petals, the much longer front lobe of the lip, and the stouter fruit.

44. V. WIGHTIANA, *Lindl. in Wight Cat.* (1833) p. 123 (sine descriptione); *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 90; caulibus crassis; bracteis ovatis subacutis; sepalis petalisque oblongo-lanceolatis subacutis; labello trilobo lobis lateralibus late rotundatis intermedio rotundato-ovato subacuto, disco lineâ mediâ hirsutâ instructo, cristâ barbatâ retrorsâ; capsulis elongato-linearibus.—*Hook. f.*, *Fl. Brit. Ind.*, vi. p. 91.

V. aphylla, *Lindl.*, *Gen. and Sp. Orch.*, p. 436, partim (*non Blume*), *Wight*, *Ic. Pl. Ind. Or.*, iii. pt. 3, p. 1, t. 931. V. Wightii, *Lindl. ex Wight*, *l.c.*, p. 1 (in note).

Hab. S. India, Deccan Peninsula, *Wight*, 2091!

Internodi 2–4 poll. longi. Bracteæ 2–3 lin. longæ. Pedicelli 1 poll. longi. Sepala et petala 9–10 lin. longa. Labellum 9 lin. longum. Columna 7 lin. longa. Capsula 6–7 poll. longa.

Quite distinct from *V. aphylla*, Blume, with which it has been confused, by its broader segments, and the different arrangement of hairs on the disc of the lip. Wight's figure is exaggerated, and the lip not correctly drawn, as is clear from his own herbarium specimens.

45. V. WALKERIÆ, *Wight*, *Ic. Pl. Ind. Or.*, iii. (1843–5) pt. 3, p. 1, t. 932; caulibus crassissimis; foliis abortivis lanceolatis

acuminatis; racemis pedunculatis multifloris, bracteis ovatis acutis; sepalis lanceolato-oblongis subobtusis; petalis subsimilibus paullo latioribus undulatis; labello integro ovato-oblongo subacuto undulato, disco medio lineis binis puberulis ad basin extensis; capsulis elongato-linearibus.—*Thw.*, *Enum. Pl. Ceyl.*, p. 311; *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 90.

Hab. Ceylon, *Walker! Champion!* At Galle, *Thwaites*, 2964! *Wight!* Travancore, at Quilon, *Wight!*

Internodi 3–4 poll. longi. Folia abortiva ½–1½ poll. longa. Bracteæ 3–5 lin. longæ. Pedicelli 1½–2 poll. longi. Sepala et petala 2–2¼ poll. longa. Labellum 1½ poll. longum. Columna 1 poll. longa. Capsula 5–6 poll. longa.

This species has much larger flowers than the preceding, though the difference is not well indicated in Wight's figures; and the hairs of the disc are also much less distinct. The flowers are white, with a little light yellow in the throat.

46. VANILLA ROSCHERI, *Reichb. f. in Linnæa*, xli. (1877) p. 65; caulibus crassis; racemis pedunculatis multifloris, bracteis triangularibus acutis parvis; sepalis lanceolato-oblongis subobtusis; petalis elliptico-oblongis quam sepala paullo latioribus; labello integro lato obtuso v. apiculato undulato, disco medio lineis binis puberulis ad basin extensis, capsulis elongato-linearibus.

Hab. E. Trop. Africa, Zanzibar, *Roscher, Kirk!*

Pedicelli 1½ poll. longi. Sepala et petala 3–3¼ poll. longa. Labellum 2½–2¾ poll. longum. Columna 1 poll. longa. Capsula 6–7 poll. longa.

This has much larger flowers than the preceding, as much as 3¼ inches long. The colour is pure white. From sketches of the flowers and fruit sent by Sir John Kirk the bracts would appear to be deciduous before the capsules are mature. The material at hand is very imperfect.

The following may belong to this species:—A sketch from the Rev. T. Wakefield, Mombasa, frequent among trees on the margins of maritime creeks between Kilimanjaro and the coast, H. H. Johnston; Giryama and Tsimba Mts. Rev. W. E. Taylor, and Samburu, Scott Elliot, n. 6132. These are all practically from the same region, but the two latter have rather smaller flowers. In each case, however, the materials are insufficient for certain determination.

47. VANILLA MADAGASCARIENSIS, *Rolfe;* racemis pedunculatis multifloris, bracteis oblongis subobtusis; sepalis petalisque oblongo-lanceolatis subacutis; labello subintegro obtuso undulato, disco subglabro; capsulâ ignotâ.

Hab. Madagascar; Bomatoe Bay, *Bojer!*

Racemi 8–9 poll. longi. Bracteæ 3–5 lin. longæ. Pedicelli $1\frac{1}{2}$ poll. longi. Sepala et petala $2\frac{1}{4}$ poll. longa. Labellum 2 poll. longum. Columna 10 lin. longa.

Allied to the preceding, but the flowers are smaller, the segments narrower, and the bracts different.

48. V. PHALÆNOPSIS, *Reichb. f., ex Van Houtte, Fl. des Serres,* xvii (1867–8) p. 97, tt. 1769–70; caulibus crassis; racemis pedunculatis multifloris, bracteis ovatis acutis; sepalis lanceolato-oblongis subobtusis; petalis elliptico-oblongis subobtusis quam sepala paullo latioribus; labello integro oblongo obtuso subundulato, disco medio lineis binis puberulis ad basin extensis; capsulis lineari-oblongis.—*Reichb. f. in Linnœa,* xli. p. 66.

Internodi 3–4 poll. longi. Bracteæ 3-5 lin. longæ. Pedicelli $1\frac{1}{4}$–$1\frac{3}{4}$ poll. longi. Sepala et petala $2\frac{1}{4}$–$2\frac{1}{2}$ poll. longa. Labellum $1\frac{3}{4}$–2 poll. longum. Columna $\frac{3}{4}$ poll. longa. Capsula 4–5 poll. longa.

Hab. Seychelle Islands, "common in all the islands," *Horne,* 607!

The disc of the lip of this species is much more pubescent at the base than in the two or three preceding ones. Mr. Horne observes that the roots adhere to rocks that are frequently so heated by the sun that they can scarcely be touched by the hand.

49. V. HUMBLOTII, *Reichb. f. in Gard. Chron.* N.S. xxiii. (1885) p. 726; caulibus crassis; racemis pedunculatis multifloris, bracteis oblongis obtusis deciduis; sepalis lanceolato-oblongis subacutis; petalis elliptico-oblongis subacutis quam sepala multo latioribus, labello subintegro rotundato-oblongo, disco puberulo medio villoso.—*Reichb. f. in Flora,* lxviii. (1885) p. 378.

Internodi 3–5 lin. longi. Bracteæ 4–5 lin. longæ. Pedicelli 2 poll. longi. Sepala et petala $2\frac{1}{4}$–$2\frac{3}{4}$ poll. longa. Labellum $2\frac{1}{4}$–$2\frac{1}{2}$ poll. longum. Columna $\frac{3}{4}$ poll. longa.

Hab. Great Comoro Islands; *Humblot,* 413!

Readily distinguished by its velutinous lip, which becomes somewhat villose on the lower half.

SECTION DOUBTFUL.

50. VANILLA POITÆI, *Reichb. f. in Linnæa*, xli. (1877) p. 66; sepalis petalisque lineatis acutis; labello cum columnâ connato antice libero expanso latissime dilatato trilobo, lobis lateralibus, rotundatis antice crispis, intermedio triangulo crispo omnibus atroviolaceo marginatis et venis insilientibus atroviolaceo pictis, lineâ latiusculâ pilorum lamellarumque retrorsarum in lineâ labelli mediâ.

Hab. Santo Domingo, *Poiteau*.

Only known from description, which is very imperfect, and contains no reference to the affinities of the species, whose position therefore remains doubtful.

DOUBTFUL OR EXCLUDED SPECIES.

Vanilla acutifolia, *Lodd.*, *Cat. ex W. Baxt. in Lond. Hort. Brit.*, *Suppl.* III. p. 655. Name only.

V. angustifolia, *Willd.*, *Sp. Pl.*, iv. (1805) p. 121 (Epidendrium domesticum, *Linn.*, *Sp. Pl.*, ed. I. p. 952), based upon Angurek Warna, *Kæmpf. Amæn.* (1712) pp. 867, 869, fig. 1, must probably be excluded from the genus.

V. axillaris, *Mill.*, *Gard. Dict.*, ed 8 (1768), n. 2, et in errat. A doubtful species, probably does not belong to the genus.

V. Fasciola, *Spreng.*, *Pl. Min. Cogn.*, *Pugill.* ii. (1815) p. 83 = *Tæniophyllum Fasciola*, Reichb. f.

V. pterosperma, *Lindl. in Wall. Cat.*, n. 7402 = *Galeola Hydra*, Reichb. f.

V. rubiginosa, *Griff.*, *Notul.*, iii (1851), p. 246 = *Galeola Hydra*, Reichb. f.

V. speciosa, *Boxall*, *ex Naves in Blanco Fl. Filip.*, ed. 3, *Nov. App.* (1880) p. 284. Name only, and altogether doubtful.

SUPPLEMENTARY NOTE.

Since the above was read, additional material has come to hand, enabling the following species to be described:—

13A. V. CRENULATA, *Rolfe;* caulibus subgracilibus; foliis petiolatis elliptico-oblongis abrupte acuminatis; racemis brevibus multifloris; bracteis late triangulari-ovatis subobtusis concavis; sepalo postico lanceolato-oblongo subobtuso concavo lateralibus elliptico-oblongis obtusis carinatis; petalis falcato-oblongis subobtusis; labello trilobo, lobis lateralibus oblongis a lateribus columnæ adnatis marginibus liberis reflexis crenulatis, intermedio triangulo-ovato subobtuso reflexo-conduplicato crenulato, cristâ appendicibus foliaceis paucis compositâ; columnâ brevi incurvâ.

Hab. W. Trop. Africa. Sierra Leone, Bumban to Lokko, *Scott Elliot*, 5733! Ashanti, Prahsu, *H. A. Cummins*, n. 4! "Flowers purple and white."

Internodi 2–3 poll. longi. Folia 2–5 poll. longa, 1½–2½ poll. lata; petioli 3–6 lin. longi. Racemi 1–1½ poll. longi. Bracteæ 1–3 lin. longæ. Pedicelli 1½ poll. longi. Sepala 11–13 lin. longa, 4–4½ lin. lata. Petala 11 lin. longa, 3½ lin. lata. Labellum 6 lin. longum. Columna 9–10 lin. longa.

Allied to *V. ramosa*, Rolfe, but distinguished by the broader and less acute crenulate front lobe of the lip, the unbranched inflorescence, &c. Mr. Scott Elliot's specimen possessed no flower, but that collected by Dr. Cummins, which is evidently identical, enables the description to be prepared. The fruit is unknown.

16A. VANILLA IMPERIALIS, *Kraenzl. in Notizbl. Bot. Gard. Berlin* (1896) p. 155, t. 1.

Allied to *V. grandiflora*, Lindl., and has yellow flowers of about the same size, though different in other respects.

Hab. W. Trop. Africa. Yaunde, near Ungomessam, Cameroon district, *Zenker and Staudt*, 626.

On the structure of the female flower and fruit of *Sararanga sinuosa*, Hemsl. (Pandanaceæ).

By O. Stapf, Dr. Phil., Assistant for India, Kew Herbarium; with an amended description of the genus and the species, by W. Botting Hemsley, A.L.S., F.R.S., Principal Assistant, Herbarium, Kew. (Communicated by the President.)

[Read 19th March, 1896.]

Plates IV–VII.

Introduction, p. 479; the Female Flower, p. 480; the Fruit, p. 485; Affinities with *Pandanus*, p. 486; Re-description of the Genus and Species, p. 488; Explanation of Plates, p. 489.

In the Journal of this Society (Botany), vol. xxx. (1893) p. 216, t. 11, Mr. W. Botting Hemsley described a new genus of Pandanaceæ, *Sararanga*, the only species belonging to it being *S. sinuosa*, Hemsl. The description and the figures were made from a dried specimen, gathered by Dr. H. B. Guppy, in Fauro Island, Solomon Group. The plant had already previously been collected by Dr. O. Beccari in Jobi Island, off the north-west coast of New Guinea; but the condition of his specimens was such that little could be said about them save that they evidently belonged to a new genus of Pandanaceæ. (See Count Solms-Laubach, in Engl. u. Prantl. Natürl. Pflanzenfam, Th. i. Abth. ii. p. 191.) Since the publication of the description of *Sararanga* further material has been received, consisting of leaves and female flowers and fruits gathered by the officers of H.M.S. "Penguin," Commander A. F. Balfour, in New Georgia, and presented to Kew by Admiral Wharton, C.B., Hydrographer to the Admiralty. There are also some photographs showing the habit of the tree, and a description, drawn up by Lieutenants B. T. Somerville and S. C. Weigall, was communicated to the Herbarium, Kew [cf. *Kew Bulletin* (1895), pp. 159, 273]. The flowering and fruiting specimens from New Georgia consisted of portions of the female inflorescence, and being preserved in cocoa butter, arrived in excellent condition for examination. As the materials from which the description of the genus was drawn up were very imperfect, a fresh examination was very desirable. I had prepared the analyses and part of the drawings of *Sararanga*, published in Mr. Hemsley's paper, and was thus to a certain extent responsible for them. I undertook, therefore, the examination of the fresh material, the results of which are contained in this paper. The male flowers are still unknown, and my observations are therefore restricted to the female.

Finally, I have to express my thanks to Mr. Thiselton Dyer for permission to include an illustration from one of the photographs mentioned above.

The Female Flower.

Before describing the structure of the female flower of *Sararanga* it may be well to repeat part of the description of the female tree by Lieutenants Somerville and Weigall as published in the *Kew Bulletin* above mentioned. This will also serve at the same time as an explanation of Pl. IV. According to this description, *Sararanga sinuosa* is a tree which attains an average height of "60 feet, including the branches which radiate out from the stem at the top of the trunk only, to a length of about 10 feet." The trunk is coated with "a thick covering cf small tendril-like roots, closely adhering together and tightly packed to the tree," but "there were no aerial roots in any instance."

"The flower head grows in the centre of the leaf branches, which themselves occur at the end of the large branches radiating from the head of the trunk. It consists of a tough main stem, strongly bent at the foot, so as to cause the flower head to hang downwards, from which spring 30 flower-branchlets diminishing in size to the point, which forms a branch itself. They grow two in opposition, followed by two more in opposition, but placed on the opposite diameter of the main stem. The lowest, largest flower-branchlet had 16 minor branches springing from it, growing irregularly both in distance and position, and bearing 162 blossoms. When first cut down the blossoms had a faint fetid odour like that of a harvest bug, which, however, soon passed off." The two panicles measured were 45 and 60 inches long; their rhachis was over 1 inch thick at the base, and the lower branches had a length of 11 inches.

Mr. Hemsley described the fleshy sinuously-lobed bodies which are born by the ultimate ramifications of the panicle as "receptacula florifera." I may state at once that I shall term them "flowers" and give the reasons later on. These female flowers (Pl. V. figs. 1, 2) of *Sararanga sinuosa* consist of a rudimentary perianth and of a gynaeceum, no traces of an androecium being discernible. The perianth has the shape of a flat, sinuously bent saucer. It is, even in a young state, rather fleshy and thick (Pl. V. figs. 3, 14). It is closely adpressed to the base of the gynaeceum, exactly following its sinuous windings, but not adnate to it. The margin is entire and there is no venation visible to the naked eye, though a microscopic examination reveals the presence of generally simple vascular bundles which radiate from the base. The gynaeceum consists of a fleshy, roughly semi-globose or subglobose body—about 6 mm. in diameter—which is sinuously lobed, as shown in Pl. V. figs. 1, 2, 6–8. The surface is smooth in a fresh state, and the colour white. The stigmas consist of small and dark wart-like protuberances, more or less round or slightly reniform. They are very numerous, upwards of 70 or 80 in one flower, and so arranged in a continuous line that the line exactly follows the branching of the gynaeceum, always keeping strictly to the dorsal ridge of the main body as well as of the lobes; but as it runs out almost right to the end of each lobe and returns strictly parallel to itself till it reaches the next sinus, and so on, it forms the sinuous double row of stigmata which is so remarkable a feature in the flower and fruit of *Sararanga*. Where the stigmata show an approach to horseshoe shape the sinus is always on the inner side (Pl. V. fig. 12), so that the sinuses of two opposite stigmata face each other. Within this double row of stigmata there is a very shallow, and sometimes quite obscure depression, in which—with the aid of a lens—minute pores (Pl. V. fig. 12, 13) may be seen, from which sometimes a more or less obscure groove extends towards the nearest stigma. As these pores and grooves are homologous to similar structures present in many species of *Pandanus* where they are assumed to indicate the ventral suture of the carpels, I will speak of these pores briefly as sutural pores. A transverse section through two opposite stigmas (Pl. V. fig. 9; Pl. VI. fig. 18) shows that there is one ovary cell below each of them and about equally distant from the top and the bottom of the gynaeceum, containing a single anatropous ovule (Pl. VI. fig. 22). This is born on a rather stout funicle, which springs from the inner basal angle of the cell. Its structure is essentially the same as in *Freycinetia javanica* (see Solms-Laubach, in Bot.

Zeit. xxxvi. (1878) t. 10, f. 13). The nucleus was re-absorbed almost completely by the embryo sac, even in the youngest states which I have seen. In figs. 8 and 9 of Mr. Hemsley's plate, illustrating *Sararanga*, I have represented this ovary cell as communicating with the sutural pores by means of a channel. When examining the fresh material from New Georgia I was convinced that such a communication does not exist. Dr. Guppy's dried specimens were very much squeezed by pressing, hence it was necessary to treat the dissections with hydrate of potassium and to flatten them out with needles. In doing this I evidently tore the tissue along a line which I, biassed by the diagram of the carpel of *Pandanus pygmæus* in Solms-Laubach's paper on Pandaneæ [Bot. Zeit. (1878) t. 10, fig. 25], took to be the stigmatic channel. Thus the gynaeceum appears to be formed by a very great number of carpels (Pl. V. figs. 10, 11) which are so completely fused into one solid fleshy body as to leave only the stigmas free, and perhaps a very small portion below them, where traces of the ventral suture, in the shape of an obscure groove, and all but microscopic pores are visible.

The anatomical structure of the flowers is on the whole very simple, except one or two peculiarities; but as *Sararanga* differs considerably from the rest of the Pandanaceæ in the morphology of its flowers and fruits, it may be worth while to mention the principal anatomical features. The epidermis of the perianth, as well as of the gynaeceum, consists of polygonal, slightly oblong, or almost isodiametric cells; the outer walls of which are distinctly thicker than the others, and covered with a strong and wrinkled or striated cuticle (Pl. V., fig. 15; VII., fig. 25). There are stomata present in the perianth (Pl. V., fig. 15) but none, so far as I am aware, in the gynaeceum. The stomata are of the ordinary kind, and surrounded by four guard-cells. The succulent parenchyma of the perianth is quite homogeneous, except some very large cells which reach a maximum length of $\frac{1}{4}$ mm. and contain bundles of rhaphides. The parenchymatic tissue of the gynæcium is much more differentiated; but before describing it I will deal with the vascular system. A considerable number of vascular bundles enter the flower from the pedicel, then, after having given off short branches for the perianth, which generally remain simple, they divide at the base of the gynaeceum in such a way that each carpel has one bundle ascending straight to the stigma on its ventral or inner side, and another ascending in a curve along its mesial line on the dorsal side (Pl. VI. figs. 18, 23). Both bundles fuse below the stigma and end here in a cluster of tracheids, very much in the same way as vascular bundles terminate below water pores (Pl. VI. fig. 21). The ventral bundle emits the branch which supplies the funicle and ends in the chalaza, where it breaks up into scattered tracheids (Pl. VI. figs. 18, 22). The parenchyma immediately below the epidermis is collenchymatic. Along the vascular bundles it forms a mantle (Pl. VI. figs. 18, 23) consisting of smaller and more oblong cells which are rather rich in plasma. A similar parenchyma fills the space between the two rows of ovary cells and surrounds that part out of which the hard endocarp is formed later on. This part consists of an outer mantle of large thin-walled cells which are radially arranged around the cavity (Pl. VI. fig. 23) and of an inner mantle which is laterally reduced to a single layer of small cells but thicker along the edges, where it remains in a meristematic condition for some time. The rest of the parenchyma of the gynaeceum consists of very wide thin-walled polygonal cells. A part of this parenchyma, but particularly the collenchyma is more or less rich in starch. The stigma (Pl. V. figs. 16, 17) is formed of thin-walled cells which radiate from the base, the peripheral ones bulging out into short and very close papillæ. The tissue forming the stigma seems to lose its vitality very soon. Even in the earliest states which I saw it was browned and apparently dry, and its cell-walls stained purple rapidly when treated with phloroglucine and chloric acid.

Finally I have to mention the peculiar structure of the tissue at the base of and around the sutural pores (Pl. VI. fig. 19; VII. fig. 24). The sutural pores vary in length, but in no case do they exceed a quarter of the distance between their mouth and the top of the ovary-cell. The mouth is funnel-shaped and circular, or more or less oblong in transverse section. Sometimes it happens that it is divided into two apertures by a narrow and low strand of tissue whilst it is simple below. The channel descending from this funnel-shaped mouth is very narrow but widens a little at the very base, particularly in a direction parallel to the double row of stigmas to which the pore belongs. The upper part of the channel, in the advanced state which the flowers examined by me were in, is generally closed by the walls of the channel being tightly pressed against each other. A longitudinal section through the pore shows that the striated and thick cuticle of the epidermis surrounding the mouth continues down the channel to the point near its base, where it widens again. The epidermis itself and the collenchyma below the mouth are also essentially the same as at any other point of the gynaeceum. At the base of the pore, however, the epidermis as well as the tissue immediately below it consists of smaller thin-walled isodiametric cells, full of plasma and having large nuclei (Pl. VII, fig. 24, e). The outer walls of the epidermis of this part are also quite thin and the cuticle delicate. Below this point the tissue continues somewhat rich in plasma for some distance; but the cells become gradually larger and more oblong (Pl. VII. fig. 24, ct), passing finally into the parenchyma which fills the space between the double rows of ovary cells. The cavity at the base of the pore sometimes expands, as mentioned above, a trifle in the direction of the stigma-rows, whilst a narrow band of a compact small-celled parenchyma extends in the same direction, joining the basal portions of all the pores with each other and with the similar tissue that surrounds the vascular bundle. The walls of the epidermis cells at the base of the pores suberize soon, though later than the stigma, and then stain purple readily with phloroglucine and chloric acid. I was led to a closer examination of these conditions by my desire to ascertain the actual function of the stigma, and of the sutural pore, and the way by which the pollen tubes reach the cavity of the ovary cell. The specimens at my disposal were, however, either too advanced or not fertilized at all. In no case did I succeed in actually tracing the pollen tubes in their descent to the ovule, although I once found two pollen grains close to a stigma, one empty and the other with the exine split, and the intine just bulging out. The pollen grains observed (Pl. V. fig. 4) were similar to those of *Pandanus fasciculatus* (Pl. V. fig. 5), and I have very little doubt that they were really pollen of a male *Sararanga*. This phase in the fertilization is still very obscure in *Pandanus*. Solms-Laubach points out that a proper stigmatic channel is present in *Pandanus pygmæus*, whilst a conductive tissue is said to extend from the ovary cell towards the stigma in the other species, so far as they have been examined. The fact that the vascular bundles terminate immediately below the stigma with a cluster of tracheids suggests that the stigma is supplied by them with water or perhaps a sugary liquid, but it is not very favourable to the assumption that the pollen-tubes make their way through the stigma, avoiding the tracheids and penetrating the surrounding collenchyma. But then the strong cuticle of the epidermis around the stigma is obviously a still greater obstacle to the pollen-tubes. Should they, however, descend into the pores they would reach at the bottom a tissue exquisitely suitable for the functions of a conductive parenchyma. Moreover, it is quite possible that the epidermis at the bottom of the pores exudes a liquid which might directly attract the pollen-tubes. If this be so, the stigmas would serve mainly to secure the pollen, whilst the sutural pores would receive the pollen-tubes as they grow out and guide them to the conductive tissue. This is, of course, nothing more than a conjecture, which will have to be verified on younger or living material of *Sararanga*, or even of *Pandanus*, where the conditions seem to be very similar.

The Fruit.

The changes which the fertilized gynaeceum undergoes to the point of full maturity are very simple (Pl. V. figs. 6–8). The gynæcium grows till it reaches three or four times the original diameter, and mainly by the expansion of its parenchymatic elements, which assume all the characteristics of the cells of a succulent fruit. Some dried fruits and part of the preserved fruits were faintly tinged with red, which colour was due to the presence of carotine-like granules in the peripheral parts. Another change has already been mentioned, that which consists in the suberization of the stigma and the epidermis at the bottom of the sutural pores, which, moreover, are more or less completely closed by the growth of the surrounding parts. Thus the only spots where, in consequence of the absence of a well developed cuticle, excessive transpiration could take place are, as it were, sealed up. Of more importance, however, are the changes which take place in the growing seed and the endocarp. The latter is formed out of the inner-cell layers of the carpel which disclose their destination already from an early stage (see p. 483 and Pl. VI. figs. 18, 23). The outermost mantle of this portion, consisting of wide, radially arranged cells, is transformed into an air-filled tissue with extremely delicate cell-walls (Pl. VII. fig. 28) which finally separate more or less from the surrounding parts and often get torn themselves, whence the stone (pyrene) appears finally wrapped in a delicate flat, filmy coat with a rugged surface. The inner mantle on the sides of the ovary cell develops into a thin sclerenchymatic shell, while the meristem, which in a young state extended all over the edges of the cell, gives rise to a strong, hard, and obtuse crest (Pl. VII. figs. 27, 28) of considerable width, consisting entirely of stone-cells of the kind common in the shells of stone fruits. The ripe seed is oblong in transverse section and completely fills the stone, the testa being very thin and consisting of much flattened brownish cells. The short raphe and the hilum near the upper end of the seed are quite distinct. The embryo (Pl. VII. fig. 29) is small, and of the form characteristic of *Pandanus*, that is, conical or ovoid, with a lateral indentation below the middle. The albumen is very copious and oily, the cells containing large aleurone grains, which enclose crystalloids and globoids, quite as in *Pandanus* (Pl. VII. fig. 30). In a perfectly ripe fruit the thin parenchymatous partitions between the stones are often more or less re-absorbed, and then the stones are closely packed together in curved rows.

It is clear from this description that the fruit of *Sararanga* is technically a " drupa succulenta polypyrena."

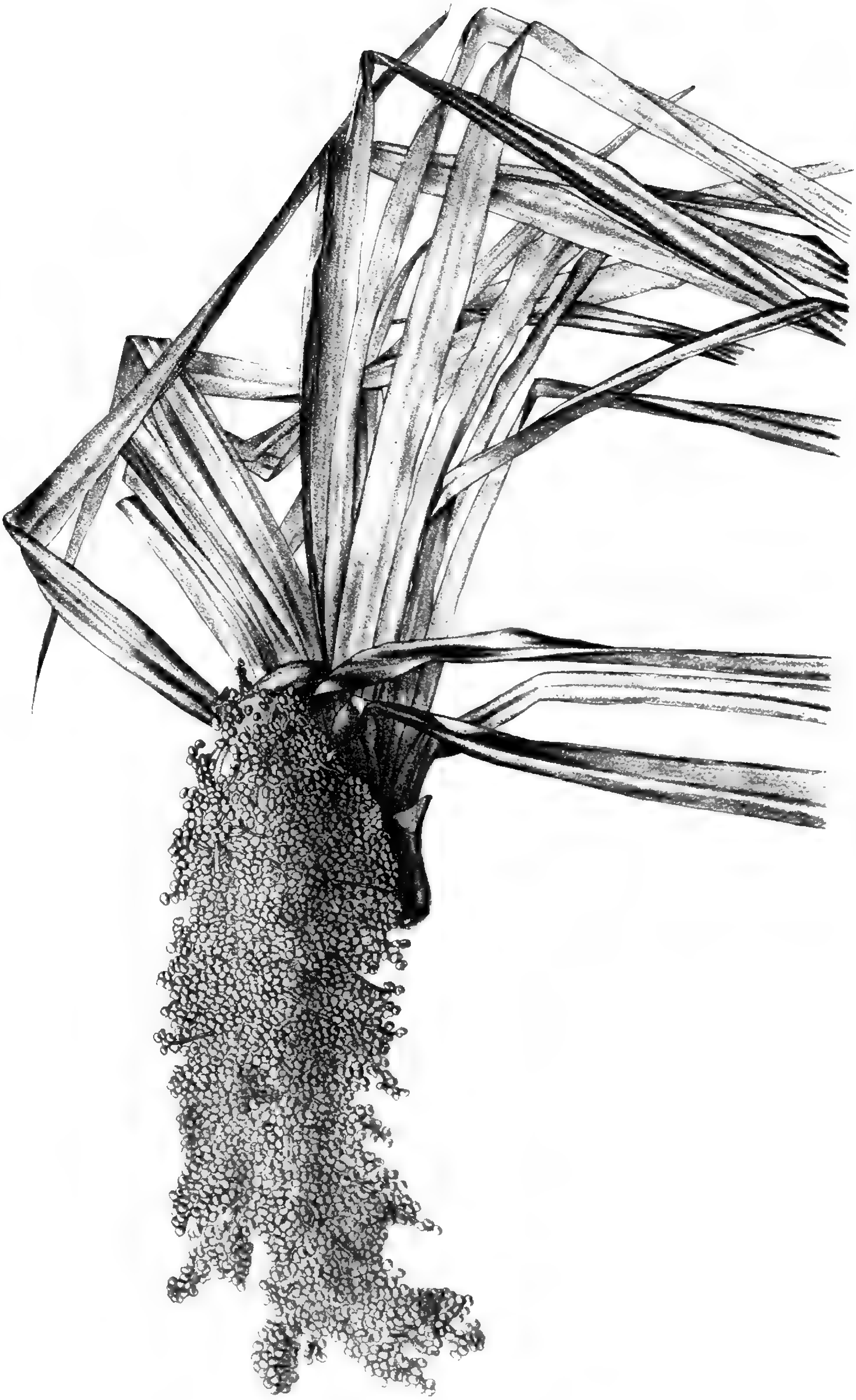
Affinities with Pandanus.

Count Solms-Laubach in his paper on Pandanaceæ, in Bot. Zeit. (1878), has pointed out that the female spadix of *Pandanus* is a spike, the sessile flowers of which exhibit a complete suppression of the perianth and, with few exceptions, of the androecium, thus being reduced to naked gynaecea. The gynaeceum itself in the struggle for space on the rhachis has in many cases undergone a kind of dislocation in the arrangement of the carpels, or a partial or complete suppression of some of them, down to a reduction to a solitary carpel. Where the typical concentric arrangement of the carpels is still maintained, the gynaeceum is polygonal in transverse section, the carpels meet with their ventral sutures in the centre, the sinuses of the often horseshoe-shaped stigmas facing also the centre. The next modification, generally connected with an increase of carpels, is the extension of the linear axis into a plane, and consequently the arrangement of the carpels into two parallel rows. In this case the carpels meet with their ventral sutures along the ideal plane, the stigmas facing this plane; when the number of carpels is still more increased, some of them are, so to say, pushed from the periphery into the centre, where they form small groups by themselves. These phalanges, as they have been called, give, I believe, a clue to the nature of the arrangement of the carpels in *Sararanga.* If we imagine a gynaeceum consisting of 70–80 concentrically-arranged carpels compressed in one direction only, they would form a long linear phalanx; but supposing them to be compressed from several sides, the forces acting approximately centripetally, the result would necessarily be an arrangement of carpels, such as we find in *Sararanga.* In fact, the multiplication of carpels to so great a number as in *Sararanga*, is only conceivable under conditions as in *Sararanga*, since the carpels cannot well be reduced in size below a certain limit, and as there is no actual axis which would increase proportionately at the same time in diameter. That a certain symmetry is still maintained in the strictly parallel arrangement of the carpels within the divisions of the gynaeceum is probably due to the absence of pressure from the nearest flowers, which, being stalked, are out of contact from an early stage, whilst they often cause the complete suppression of one half of the phalanx in *Pandanus*, where all the flowers are sessile. On the other hand, the gynaeceum is not exactly symmetrically lobed, and this I am inclined to explain by the absence of stamens or a more differentiated perianth or any other organs with a definite disposition, which might determine the development of the gynaeceum. Although the disposition of the carpels is on the whole more complex in *Sararanga* than in certain species of *Pandanus* having linear phalanges, it is, nevertheless, in every respect the same within each division or lobe. Thus it is not difficult to trace the structure of the gynaeceum of *Sararanga* back to the perfectly plain type of a *Pandanus*, like *P. fascicularis*, and if Solms-Laubach's interpretation of the female flower of *Pandanus* is correct, and I cannot see how it could be called in doubt in view of the perfectly unambiguous structure of the flower of *Freycinetia*, we must consider also each of the fruits of *Sararanga* as the product of a single female flower. The essential differences between *Sararanga* and *Pandanus* are then the panicled ramification of the inflorescence, the presence of a rudimentary perianth, and the ultimate transformation of the gynaeceum into a berry-like, very succulent drupe in *Sararanga*, against the spadiciform inflorescence, the complete absence of a perianth, and the generally more woody character of the drupe in *Pandanus*.

Sararanga, *Hemsl. in Journ. Linn. Soc. (Bot.)*, xxx. (1894) p. 216, Pl. XI. *Generis Character hic emendatus*, a W. Botting Hemsley. *Flores* dioici, ♂ ignoti. *Florum* ♀ spatha foliacea, folio parvo simillima. *Spadix* amplissimus, densissime racemoso-paniculatus, ramosissimus, pendulus, ramulis compressis. *Flores* ♀ breviter pedicellati; perianthium liberum, subcarnosum, gamophyllum, truncatum vel irregulariter 3-4-lobatum, fructiferum occultum; staminodia nulla; gynaecei carnosi carpella numerosissima, uniovulata, sinuoso-biseriata, seriebus nunc e centro gynaecei trifurcatis ramificationibus bifurcatis, nunc valde irregularibus sed serierum dispositio stigmatibus sessilibus magnis discoideis vel hippocrepiformibus bene indicata. *Fructus* parvus, carnosus, drupoideus, irregulariter 2–4-lobatus, multipyrenus, pyrenis osseis 1-spermis; semen a funiculo elongato e fere basi anguli interni loculi pendulum, embryone conoideo basilari.

Sararanga sinuosa, *Hemsl. Arbor* pandaniformis circiter 60-pedalis, trunco nudo (radices aëreas haud emittente) apicem versus tantum ramoso. *Folia* ad apices ramorum conferta, spiraliter disposita, crassissima, coriacea, lineari-lanceolata usque ad 10 ped. longa, 4½ poll. lata, basin et apicem versus in margine et secus costam aculeis minutis instructa, apice vix acuta. *Spatha* foliacea sed omnino inermis, circiter bipedalis. *Spadix* albus, 4–5 ped. longus, rhachi prope basin usque 4½ poll. diametro. *Pedicelli* graciliusculi, 3–9 lin. longi. *Fructus* maturus 6–9 lin. diam.; pyrenæ obovatæ, valde compressæ, vix 1 lin. diam.

Fauro Island, Solomon Group, at elevations of 1,600 to 1,900 feet, *Dr. H. B. Guppy*. New Georgia, Solomon Group, "found growing exclusively at the estuaries of rivers and generally in clumps of three or four," *Lieutenants Boyle, T. Somerville*, and *S. Weigall*. Jobie Island, North-West New Guinea, *Dr. O. Beccari*.



O. Stapf del.
R. Morgan lith.

West, Newman imp.

SARARANGA SINUOSA, *Hemsl.*

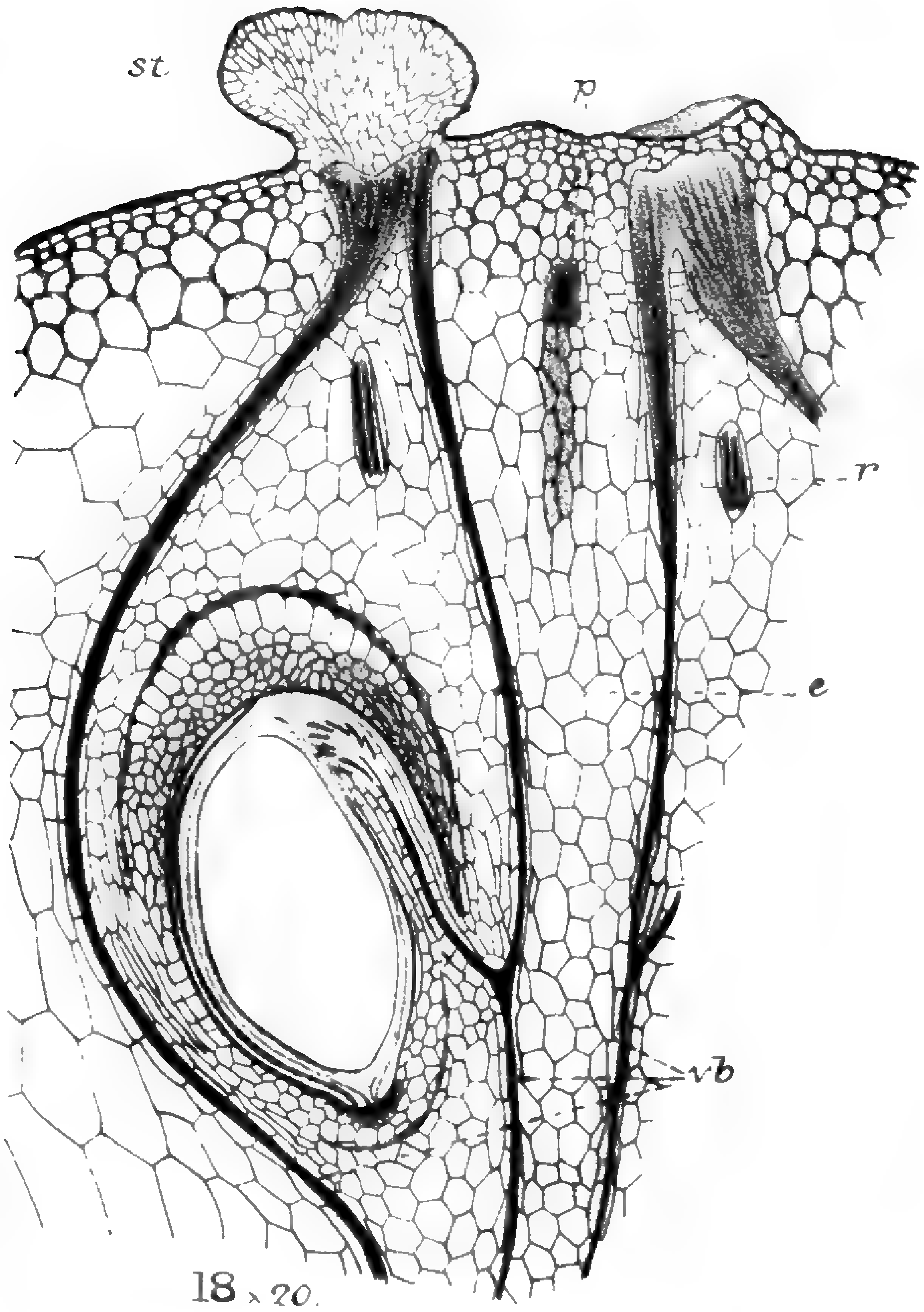
Stapf.

1 × 3
2 × 3
3 × 2
4 × 200
5 × 200.
6 × 1
7 × 1
8 × 1
13
9 × 2
p
s
s
12
10 × 8
11 × 3
16 × 110
r
14 × 10
15 × 200
g
17 × 200

O. Stapf del.
H. Morgan lith.

SARAHANGA SINUOSA, Hemsl.

West, Newman imp.



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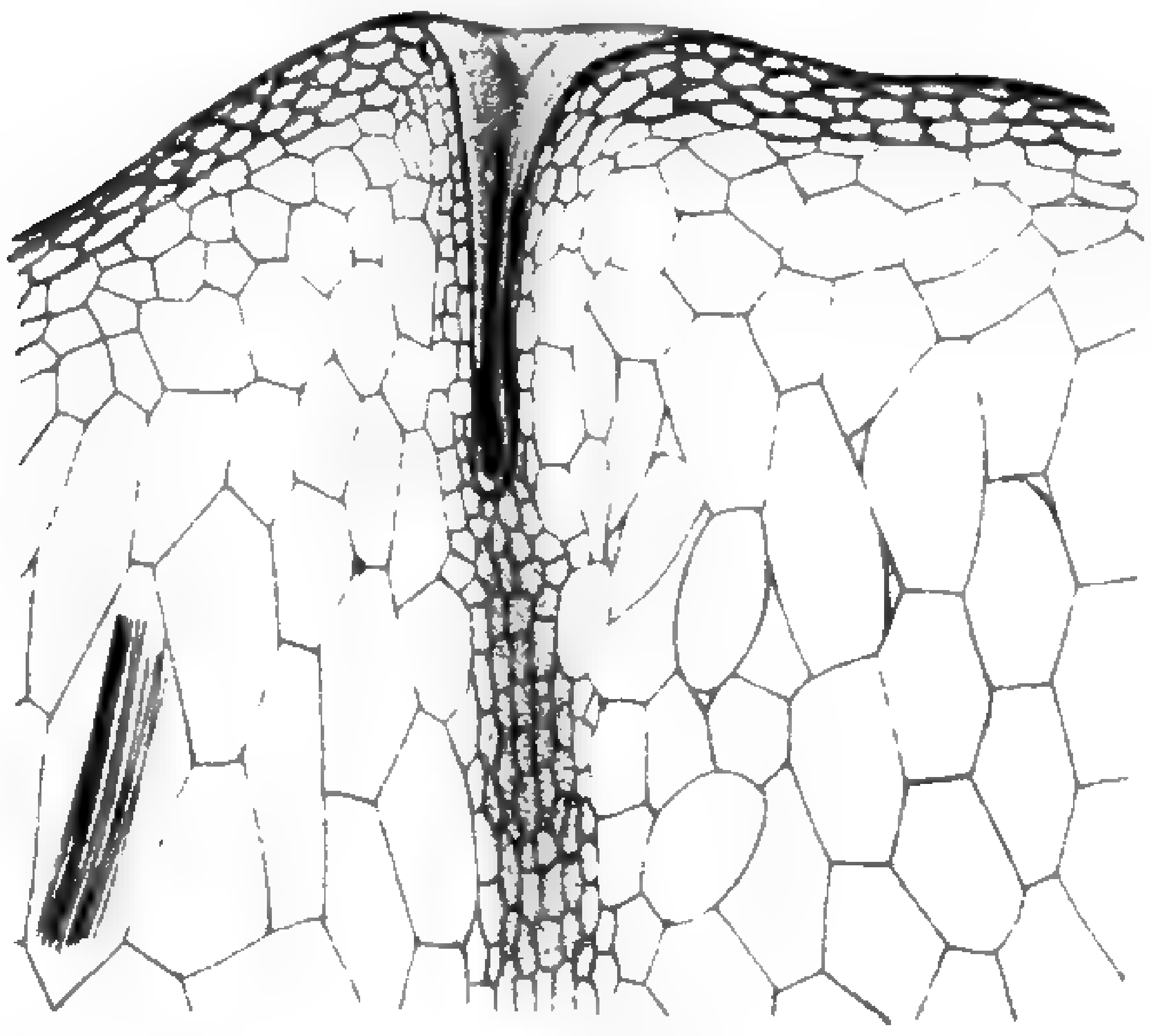
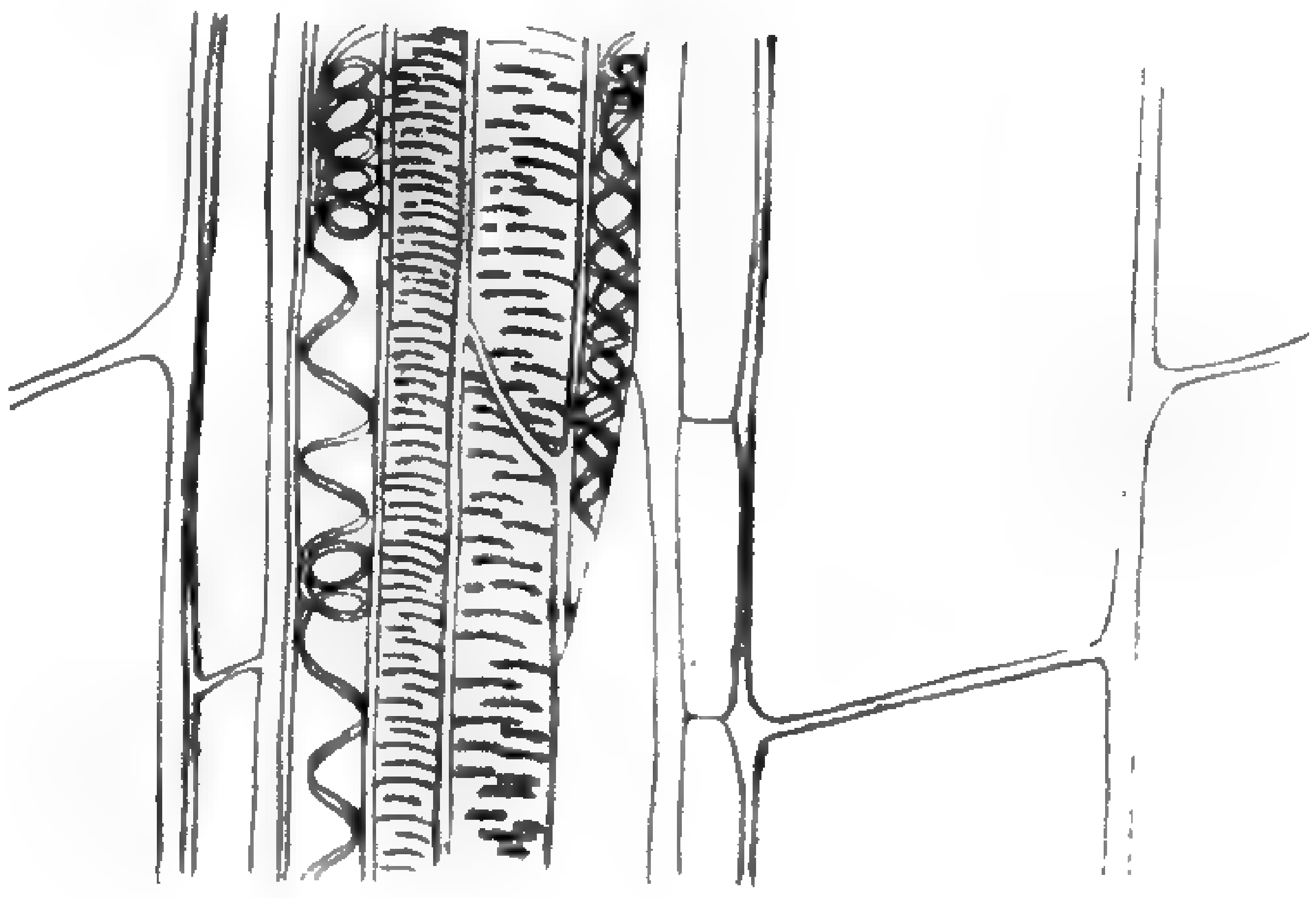
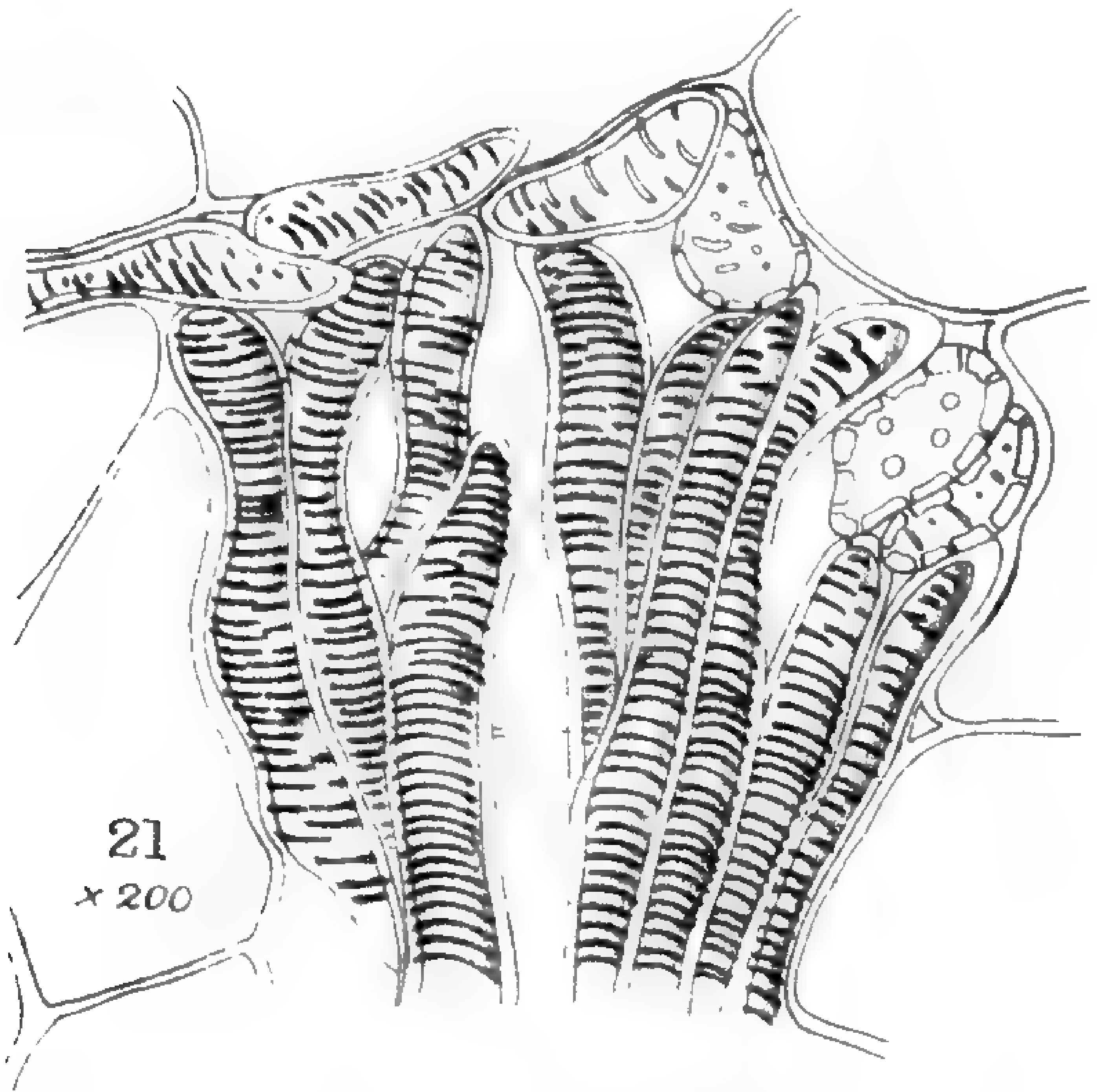


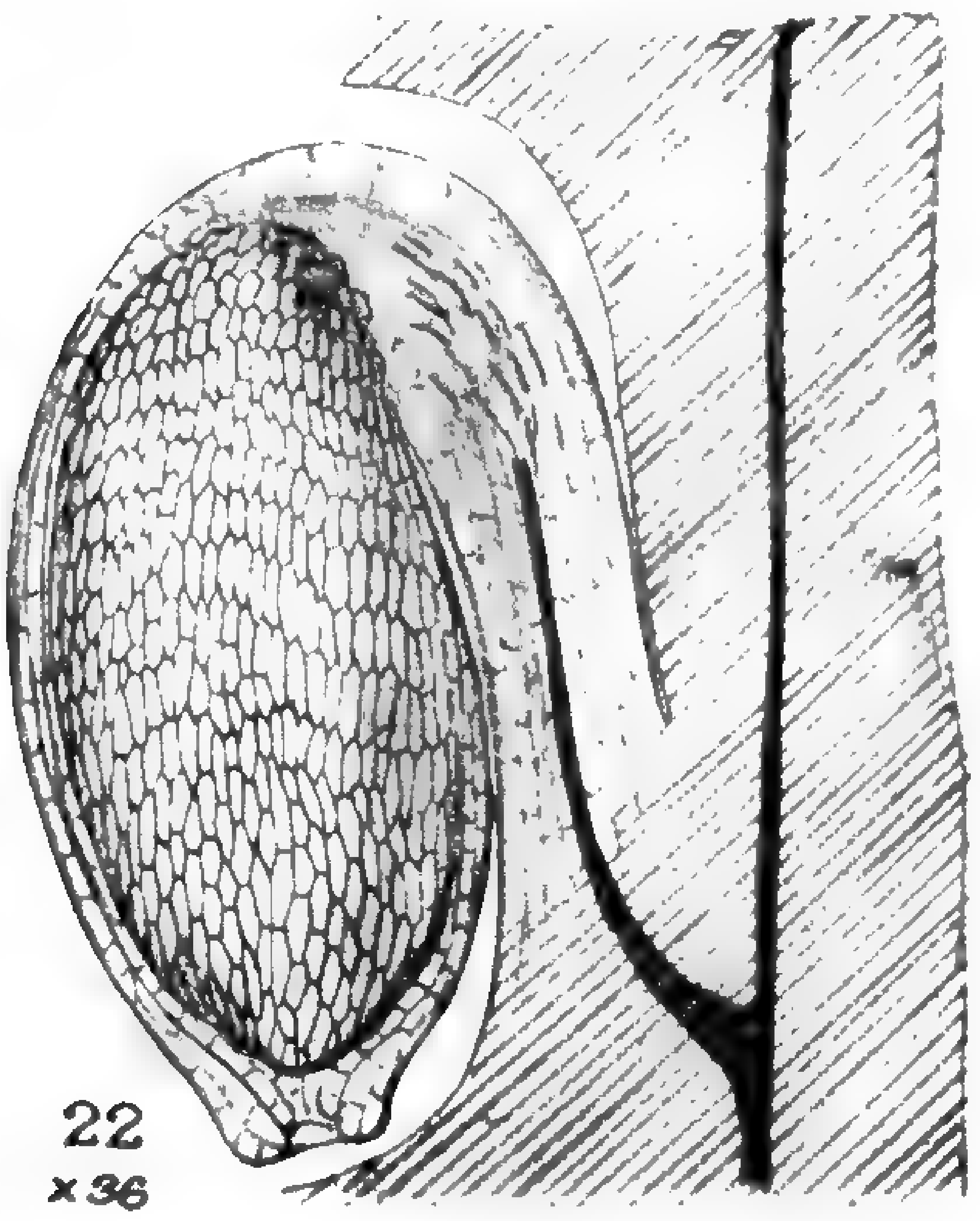
19 × 36



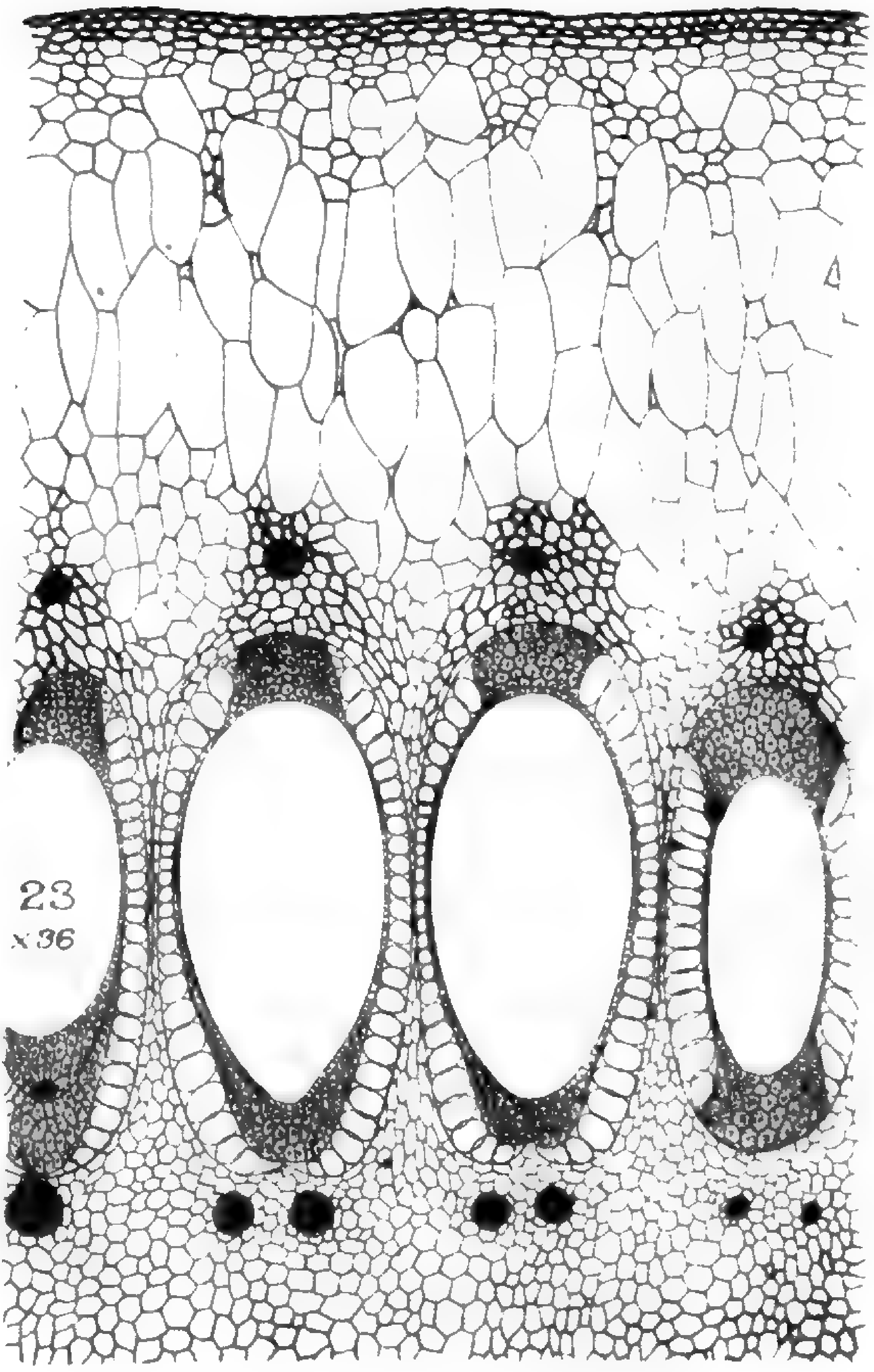
20 × 200.



21
× 200



22
× 36



23
× 36

O. Stapf del.

West, Newman imp.

24 × 200
e
ct
25 × 300
26 × 200.
27 × 20
e
28 × 30
29 × 80
30 × 200
c
a

O. Stapf del.
R. Morgan lith.

West, Newman imp.

SARARANGA SINUOSA, *Hemsl.*

EXPLANATION OF PLATES.

Plate IV.

Top branch of tree, showing leaves and inflorescence, from a photograph by Lieutenants Somerville and Weigall.

Plate V.

Figs. 1 and 2. Female flower in front and back view.
Fig. 3. Flower, vertical section passing through two opposite ovary cells.
4. Pollen found on a gynæcium of *Sararanga sinuosa.*
5. Pollen of *Pandanus fasciculatus* (for comparison).
Figs. 6—8. Ripe fruit, from different sides.
Fig. 9. Ripe fruit, vertical section passing through two opposite pyrenes.
10. Part of a young fruit, cross section.
11. The same, vertical section parallel to the stigma row.
12. Stigmas and stigma scars (s) and sutural pores (p).
13. Mouth of sutural pore.
14. Part of the perianth (r : raphid cells).
15. Epidermis of the perianth with stoma (g : guard cells).
16. Stigma, vertical section.
17. Papillæ of the stigma.

Plate VI.

Fig. 18. Vertical section through a carpel (st : stigma; p : base of a pore, the channel being behind the optical section; vb : vascular-bundles; e : young endocarp . r : raphid cell).
19. Vertical section through a pore, at a right angle to the stigma row.
20. Part of vascular bundle.
21. End of the vascular bundle below the stigma.
22. Ovule.
23. Cross section through several collateral carpels.

Plate VII.

Fig. 24. Sutural pore, longitudinal section (e : epithelium ; ct : conductive tissue ?).
25. Epidermis cells (outer wall and cuticle) from the mouth of pore.
26. Epithelium at the base of the pore, top view.
27. Longitudinal section through seed, passing through the crest (e : embryo).
28. Cross section through seed.
29. Embryo.
30. Albumen (a : aleurone grains in oil; c : crystalloids, laid free by the dissolution of the aleuron).

On the genus *Stemona*, Lour. By C. H. Wright, Assistant in the Herbarium, Royal Gardens, Kew. (Communicated by W. T. Thiselton Dyer, C.M.G., C.I.E., F.R.S., F.L.S.)

[Read 2nd April, 1896.]

The genus *Stemona* was founded in 1790 by Loureiro in his Flora Cochinchinensis, p. 404, where he describes a single species, *S. tuberosa*. Five years later Banks described the same plant in Roxburgh's Plants of the Coromandel Coast, i. p. 29, t. 32, also as a new genus with the name of *Roxburghia gloriosoides*, under which name the species was formerly cultivated. This is one of the few monocotyledonous genera with tetramerous flowers, and it is remarkable for the great diversity presented by its vegetative characters, while its reproductive organs vary within limits too narrow to admit of it being split up into several genera.

The stamens present the most interesting feature of the flower. The very short, often broad, filament is surmounted by a very wide connective, which is produced on the postical surface into a keel slightly longer than the two anther cells, which it completely separates. Above this the connective is produced into a more or less subulate appendage, often several times the length of the anther cells, and bears upon its postical face two small keels, whose lower edges slightly overlap the upper end of the keel previously mentioned. The pollen is of a somewhat waxy nature, and that contained in each cell is welded into a single mass provided with a caudicle which protrudes from the apex of the anther cell and joins over the upper edge of the lowest keel with the caudicle from the other cell, and from this point the two united caudicles are prolonged upwards. The masses thus formed resemble those met with in the *Asclepiadeæ*. The caudicles of the four stamens bend inwards and touch, while the prolonged connectives bend outwards. The ovary is one-celled, with several erect ovules. The seeds are oblong, and contain a small, straight embryo in the axis of copious albumen. The spermoderm is sulcate and produced into a small apiculus at one end. The funiculus often attains a considerable length, and bears, just below the seed, a bunch of filamentose or vescicular appendages.

The form most remote from the generic type is met with in *S. Griffithiana*, Kurz, which is an erect herb, whose leaves are not produced until after the racemose scape. Next to this come two species also with erect habit, but whose flowers are produced on the leafy stem, viz., *S. sessilifolia*, Miq., and *S. erecta*, C. H. Wright. All the other species are climbers. The leaves, as shown by the subjoined key, are either verticillate, opposite, or alternate. In appearance they much resemble certain species of *Dioscorea*, but are at once distinguished by the primary veins of the leaves being connected by numerous approximate transverse ones, a character also possessed by the South African Liliaceous genus *Behnia*, whose floral structure, however, is quite different.

The species of this genus occur chiefly in Eastern Asia, six being found in the Malayan Peninsula and Archipelago, two in India proper, four in China, two in Japan, while two extend to Australia.

STEMONA, *Lour.*, *Fl. Cochinch.*, p. 404 (1790). *Roxburghia*, Banks, in Roxb. Pl. Corom., i. p. 29, t. 32 (1795).

Herbacea vel suffruticosa. Caulis erectus vel sæpius scandens. Folia alterna, opposita vel verticillata, petiolata, nerviis pluribus transversalibus approximatis. Pedunculi axillares, liberi vel ad petiolos adnati; flores tetrameri; perianthii segmenta distincta, imbricata. Staminorum connectivum inter et ultra antherarum loculos longe productum; antheræ longitudinaliter dehiscentes. Ovarium parvum, uniloculare; stigma sessile, punctiforme; ovula 3–∞, erecta; capsula bivalvata; semina 2–∞, albuminosa; funiculus sæpe elongatus, apice appendiculatus; embryo rectus, axillaris.

CLAVIS SPECIERUM.

A. Folia hysterantha .. .. .. 1. *S. Griffithiana.*
B. Folia eodem tempore ac flores producta.
  1. Folia verticillata.
    α. Caulis erectus.
      Folia ovata. Perianthii segmenta late lanceolata .. .. .. 2. *S. sessilifolia.*
      Folia elliptica. Perianthii segmenta anguste lanceolata .. .. 3. *S. erecta.*
    β. Caulis scandens.
      Folia acuminata, basi rotundata, pedicelli ad petiolos adnati .. 4. *S. japonica.*
      Folia acuta, basi profunde cordata, pedicelli liberi .. .. .. 5. *S. acuta.*

2. Folia opposita.
Pedicelli ad petiolos adnati .. .. 6. *S. moluccana.*
„ liberi .. .. .. 7. *S. tuberosa.*
3. Folia alterna.
α. Pedunculi 2–3-flori.
Perianthii segmenta oblonga, acuta 8. *S. Curtisii.*
„ „ lanceolata .. 9. *S. minor.*
β. Pedunculi uniflori.
Folia ovato-cordata .. .. 10. *S. javanica.*
„ lanceolata vel oblonga.
Perianthii segmenta angusta .. 11. *S. australiana.*
„ „ late ovato-lanceolata .. .. .. 12. *S. parviflora.*

1. STEMONA GRIFFITHIANA, *Kurz, in Journ. As. Soc. Beng.*, xlii. part II. p. 109, t. 10; herbacea, erecta, foliis ovatis post anthesin productis.

Herba erecta, glabra. Rhizoma crassum. Folia ovata, 3–5 poll. longa, breviter acuminata, chartacea, glabra, "sericanter nitentia," nerviis transversalibus pluribus; petiolus 3-5 poll. longus. Scapus erectus, corymboso-racemosus, aphyllus, 3–6 poll. longus; pedicelli 1 poll. longi, stricti; bractea lanceolata, acuminata, 3–4 lin. longa. Perianthii segmenta lanceolata, viridia vel fusco-purpurea. Staminorum filamenta lata, purpurea; antheræ luteæ, cuspidatæ. Ovarium uniloculare; ovula 6, lineari-oblonga, erecta. Capsula 6 lin. longa, 2-valvata, 3–4-sperma; semina lineari-oblonga, sulcato-carinata, subapiculata, basi arillata.

"Gen. nov.," Griff., Journ. of Travels, p. 149.

BURMA: Ava, Martaban, and Pegu, *Griffith*.

This species differs from all the others in having its flowers produced before the leaves. The ovules are erect, not pendulous as stated by Kurz.

2. S. SESSILIFOLIA, *Franch. et Sav., Enum. Pl. Jap.*, ii. p. 92; herbacea, erecta, foliis verticillatis obovatis vel late ovatis, perianthii segmentis late lanceolatis.

Herba erecta; caulis angularis, subtus nudus. Folia quaternatim verticillata, sessilia vel subsessilia, obovata vel late ovata, apice rotundata, subito brevissimeque apiculata, 1½–2 poll. longa. Pedunculi axillares vel ex axillis bractearum lanceolatarum locum foliorum tenentes. Perianthii segmenta late lanceolata, 9-nervia, poll. longa, lutescentia nisi basi purpurea.

Roxburghia sessilifolia, Miq. in Ann. Mus. Bot. Lugd. Bat., ii. p. 211; Phonzo Zoufou, xxviii. t. 6; Sô Mokou Zoussetz, ii. t. 55.

R. japonica, Miq. ex Franch. et Sav., Enum. Pl. Jap., ii. p. 92 in syn.

JAPAN: *Siebold;* Yedo, *Savatier.*

3. STEMONA ERECTA, *C. H. Wright, in Kew Bull.* (1895) p. 117; et *Hook., Ic. Pl.*, t. 2389; herbacea, erecta, foliis verticillatis, ellipticis, perianthii segmentis anguste lanceolatis.

Herba erecta, glabra. Caulis 1–2 pedalis, angularis vel striatus; folia quaternatim verticillata, elliptica, 2–2½ poll. longa, 1 poll. lata, breviter subitoque acuminata, basi in brevem angustum petiolum contracta. Pedunculi uniflori, ex axillis bractearum locum foliorum inferiorum tenentes, basi decurvati, apice recurvati. Flores erecti; perianthii segmenta anguste lanceolata acuta, 6–7 lin. longa. Stamina perianthii segmentis breviora; antheræ lineares; connectivum in appendicem levem apice productum. Ovula 6, erecta.

CHINA: Anwhei, Nanking, *Faber*, 1541.

4. S. JAPONICA, *Franch. et Sav., Enum. Pl. Jap.*, ii. p. 92; scandens, foliis verticillatis, pedunculis ad petiolos adnatis.

Suffruticosus, scandens. Radix ex tuberis pluribus oblongis constata; folia ternatim verticillata, ovato - lanceolata, 5–7-nervia, 3 poll. longa, 1–1½ poll. lata; petiolus tenuis, 1 poll. longus; pedunculi ad petiolos adnati, pauciflori; bracteoli a floribus distantes; perianthii segmenta oblongi, recurvati.

Roxburghia japonica, Blume, Enum. Pl. Jav., i. p. 9 (non Miq.).

R. ruscifolia, Zucc. ex Schnitzl., Iconogr., i. t. 56 B, fig. 17.

JAPAN, JAVA.

5. S. ACUTA, *C. H. Wright;* scandens, foliis verticillatis, cordatis, acutissimis, pedunculis liberis.

Frutex scandens. Folia ternatim verticillata, membranacea, a basi cordatâ ad apicem acutissimum sensim producta, 4 poll. longa, 1½ poll. lata, 9-nervia, nerviis pluribus transversalibus connexis; petiolus tenuis, 1½–2 poll. longus. Pedunculus axillaris, uniflorus, 3 poll. longus, bracteolo parvo solitario a flore distante. Perianthii lobi lanceolati, acuti, 1½ poll. longi, 7–9-nervii. Stamina 4, filamentis 2 lin. longis compressis;

antheræ angustæ, 3 lin. longæ; connectivum ultra loculos in appendicem linearem carinatum 8 lin. longum et inter loculos in carinam productum. Ovarium parvum, ovoideum, ovulis 12–15, erectis; stigma sessile.

CHINA: Kwangtung, *Ford*, 283.

This differs from *S. japonica*, Franch. et Sav., in having very acute leaves, gradually tapering from a cordate base, and in the peduncles not being adnate to the petioles.

6. STEMONA MOLUCCANA, *C. H. Wright;* foliis cordatis, pedunculis ad petiolos adnatis, perianthii segmentis angustis.

Caulis scandens, "vix culmum crassus." Folia opposita, cordata, 5–6 poll. longa, 3–3½ poll. lata, atro-viridia, 7–11-nervia. Pedunculus ad petiolum adnatum, 4 poll. longus, 2–3-florus. Perianthii segmenta angusta, viridia. Stamina 4, connectivo ultra antheræ loculos producto.

Roxburghia moluccana, Blume, Enum. Pl. Jav., i. p. 9.

Ubi Gorita nigrum, Rumph., Hort. Amb., v. p. 365.

JAVA.

This species is known only from the brief description by Rumphius.

7. S. TUBEROSA, *Lour., Fl. Cochinch.*, p. 404; scandens, foliis oppositis, pedunculis a petiolis liberis, perianthii segmentis lanceolatis.

Radix tuberosa. Caulis fruticosus, scandens. Folia ovata, cordata, acuminata, 7–15-nervia, integra, glabra, 3–7 poll. longa, 2–5 poll. lata; petioli tenues, 1½–3 poll. longi. Pedunculi axillares, 1–3-flori; bracteoli lanceolati, a floribus distantes. Perianthii segmenta lanceolata, 2 poll. longa, 4 lin. lata. Filamenta brevia; antheræ lineares, connectivo inter ultraque loculos producto. Ovarium parvum; ovula circa 6 erecta. Capsula 2-valvata.

Stemona gloriosoides, Voigt, Hort. Suburb. Calc., p. 650.

Roxburghia gloriosa, Pers. Syn., i. p. 412; Bot. Mag., t. 1500.

R. gloriosoides, Roxb., Pl. Corom., i. p. 29, t. 32 (non Zoll).

R. Stemona, Steud. Nomencl., ed. II. ii. p. 475.

R. viridiflora, Sm., Exot. Bot., i. p. 111.

INDIA: Bengal, *Rottler*, *Griffith*, 5600; Bhaugulpore, *Hooker;* Cherra, *Hooker and Thomson*, 849; Chela, *C. B. Clarke*, 14936; Chittagong, *Hooker and Thomson*, 319, *C. B. Clarke*, 19787; Sillet, *Wallich*, 5156 B; Amboina, *Barclay*, 4131; Pahang, *Ridley*. PHILIPPINES: Luzon, *Vidal*, 3942. CHINA: Ichang, *A. Henry*, 566; Amoy, *Swinhoe;* Formosa, Bankinsing, *A. Henry*, 816.

8. STEMONA CURTISII, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 298; scandens, foliis alternis, cordatis, longe acuminatis, floribus unisexualibus, perianthii segmentis oblongis acutis.

Caulis fruticosus, scandens, tenuis. Folia alterna, cordata, longe acuminata, 9–11-nervia, 4–6 poll. longa, 2–3 poll. lata; petiolus elongatus, debilis. Pedunculus axillaris, 1½–3 poll. longus, 3-florus; bracteola parva, lanceolata, ad pedicellorum basin. Flores unisexuales? Perianthii lobi 9 lin. longi, 2 lin. lati, oblongi, acuti. Filamenta brevissima, lata; antheræ 3 lin. longæ; connectivum latum inter ultraque antheræ loculos productum. Ovarium parvum, oblongum; ovulis 6 erectis. *Bot. Mag.*, t. 7254.

PENANG: *Curtis*, 1522.

9. S. MINOR, *Hook. f.*, *Fl. Brit. Ind.*, vi. p. 298; scandens, foliis alternis, deltoideis, perianthii lobis lanceolatis.

Caulis suffruticosus, scandens, plus minusve quadrangularis. Folia alterna, deltoidea, acuta, basi rotundata vel cordata, 7–9-nervia, 1½–3 poll. longa. Pedunculus simplex vel ramosus, 2–4 poll. longus, in axillæ folii vel bracteæ parvæ scariosæ positus, floribus 2–6 bracteolatis. Perianthii lobi lanceolati, ¾–1 poll. longi, 2 lin. lati. Stamina 8 lin. longa; antheræ 2 lin. longæ; connectivum inter ultraque antheræ loculos productum, parte superiore bicarinatâ latere postico. Ovarium oblongum, ovulis 6 erectis. Capsula 2-valvata.

Roxburghia gloriosoides, Wight, Ic., t. 2061.

R. gloriosoides var. *minor*, Thwaites, Enum. Pl. Zeyl., p. 432.

MALABAR: Pulicat Hills, *Wight*, 2821. MADRAS, Nagari Hills, *Beddome*, 7770; Ceylon, *Glennie in Herb. Thwaites*, 3775.

This resembles *S. tuberosa*, Lour., but is smaller in all its parts, and its alternate leaves are proportionately broader at the base.

10. S. JAVANICA, *C. H. Wright;* scandens, foliis ovatis, basi cordatis, perianthii segmentis lanceolatis acutis.

Suffruticosus, scandens. Caulis teres, spiraliter contortus, glaber, tenuis. Folia alterna, ovata, breviter acuminata, basi cordata, 7–9-nervia nerviis subtus prominentibus, membranacea, 3–5 poll. longa, $1\frac{1}{2}$–$2\frac{3}{4}$ poll. lata; petiolus 6–14 lin. longus, glaber. Pedunculi 2–6 axillares, uniflori; bractea ovata, acuminata, scariosa. Perianthii segmenta lanceolata, acuta, 5 lin. longa, 1 lin. lata. Capsula oblonga, subrostrata, 6–10 lin. longa, 2-sperma.

Roxburghia javanica, Kunth, Enum. Pl., v. p. 288.

R. gloriosoides, Zoll. ex Kunth, Enum. Pl., v. p. 288 (non Roxb.).

R. javanica var.? *australiana*, Benth., Fl. Austral., vii. p. 1, ex parte.

Dioscorea lucida, R. Br., Prod. Nov. Holl., p. 295.

JAVA: *Teysmann.* QUEENSLAND: Endeavour River, *Banks and Solander.*

11. STEMONA AUSTRALIANA, *C. H. Wright;* scandens, foliis oblongis, acutis, basi rotundatis vel acutis.

Suffruticosus, scandens. Caulis leviter striatus. Folia oblonga, acuta, basi rotundata vel acuta, 3–5 poll. longa, $\frac{3}{4}$–$1\frac{1}{2}$ poll. lata. Pedunculi solitarii vel per paria in foliorum axillis, tenues, 6 lin. longi. Perianthii segmenta oblonga, angusta, acuta, 5 lin. longa, 1 lin. lata. Stamina 4 lin. longa, connectivo angusto.

Roxburghia javanica var.? *australiana*, Benth., Fl. Austral., vii. p. 1, ex parte.

N. AUSTRALIA: Port Endeavour, *Armstrong.*

12. S. PARVIFLORA, *C. H. Wright;* scandens, foliis alternis, floribus breviter pedunculatis parvis, perianthii segmentis late ovato-lanceolatis.

Frutex scandens, ramulis tenuibus striatis. Folia alterna, lanceolata, acuta, 2 poll. longa, quinquenervia, nerviis transversalibus pluribus tenuissimis. Flores parvi, per 2–6 axillares, breviter pedicellati, bracteis minutis subulatis. Perianthii segmenta late ovato-lanceolata, acuta, 9-nervia, 3–4 lin. longa. Stamina perianthii segmentis paullo breviora; antheræ parvæ; connectivum ultra antheram per 2 lineas productum. Ovarium ovatum, 2 lin. altum; stigma sessile; ovula 3, erecta.

CHINA: Hainan, *A. Henry*, 8698.

This somewhat resembles *S. australiana*, but has much smaller, shortly pedicellate flowers, with broadly ovate-lanceolate perianth segments.

CYRTANDRACEÆ MALAYENSES. By H. N. RIDLEY, M.A., F.L.S.

[Read 4th April, 1895.]

THE number of plants belonging to the Order *Cyrtandraceæ* recorded from the Malayan Peninsula in the 'Flora of British India' (vol. iv.) is very small in comparison with the number which are now known. The reason for this lies in the fact that the best localities, the hill districts of the interior, were, at the time the work was written, practically inaccessible to botanists, and these plants are usually so local that every hill range may be expected to produce new kinds. The richest locality I have visited is the Thaiping Hills, in Perak, where the roadside banks are often brilliant with the flowers of *Didymocarpi*, *Didissandræ*, and other plants of this order, but Mr. Curtis has found even a richer store in the Lankawi Islands, north of Penang. Here, where the rocks are of limestone, species of *Bœa*, *Chirita*, and *Didymocarpus* abound. The extensive hill regions of the central range of the peninsula have not yet been explored, but there is little doubt but that they will add largely to our store of these plants, when they are opened up to collectors.

The peculiarly limited distribution of the species of Indian *Didymocarpi* has been pointed out by Mr. C. B. Clarke, in his Monograph (in DC. Monog. Phan., v. p. 5), and the same peculiarity holds here.

The *Æschynanthi* at present number eleven species, of which all but four occur also in Borneo, Sumatra, and Java, two are also natives of Burmah and Siam, and two are endemic. The single species of *Agalmyla* which, like *Æschynanthus*, has tailed seeds, occurs also in Java. *Rhynchotechum* is represented by a single species apparently identical with one from Java. The single species of *Epithema* is a native of Java, but if, as I think, the other Asiatic species are but forms of one, its distribution extends also over India, Ceylon, and the eastern islands as far as Timor and the Philippines, being perhaps the most widely distributed of any Asiatic species in the order. It stands alone in having a pyxis-capsule, the top of which falling off exposes the seeds, which are washed out by rain, or shaken out possibly by wind, and adhering by their roughened surfaces to rocks and stones readily germinate. This plant is the only one in the order which has established itself as a weed in the Botanic Gardens at Singapore, in the brickwork and rocks forming the walls of plant-houses.

The shrubby or half-shrubby Cyrtandras are represented by six species, of which three are known also from Sumatra or Java, and three are endemic. They have dry, dull-coloured, and inconspicuous corky fruits, full of small seeds. In *C. pendula*, Blume, the long peduncles hang down over the rocks, so that the head of fruits is often buried among the decaying leaves. The fruit is often devoured by some animals, perhaps mice, and possibly the seeds are dispersed in this manner.

Of the two species of *Cyrtandromœa*, one occurs all over the peninsula and in Sumatra, and the other appears to be endemic.

Stauranthera is represented by two species, also known from Burmah and Assam respectively, but not from the Malayan Islands. The section *Didymocarpeæ* is far more localized in distribution, out of forty species of *Didymocarpus* and the closely allied *Didissandra* and *Chirita*, thirty-eight are confined to the Malay Peninsula; one, *Chirita viola*, Ridl., occurs also in Siam as well as Lankawi, and two in Sumatra also. The single species of *Phyllobœa* and *Monophyllœa* are endemic, as are all the eight species of *Bœa*, five of which are peculiar to the Lankawi Islands.

The *Didymocarpi* are remarkably circumscribed in locality; thus, of the numerous saxophilous species occurring on the Thaiping Hills, in Perak, I have not seen one from Mt. Ophir, in Malacca, nor Kedah Peak, nor from the Lankawi Islands, unless one excepts *Didymorcarpus cordata*, Wall, of which a distinct form occurs in each of the first two localities. Mt. Ophir itself also produces *D. semitata*, C. B. Clarke, *D. longipes*, C. B. Clarke, and *D. marginata*, C. B. Clarke, which occur nowhere else, and, indeed, their area in this locality is exceedingly limited, the first named being confined to the wet slopes of rock over which the one or two streams run down the hill, at an altitude of from 2,000 to 3,000 feet; and *D. longipes*, C. B. Clarke, is only to be met with in the drier parts of the woods adjacent to the streams.

The *Didymocarpi*, *Didissandræ*, and *Chiritæ* have slender pods, which split along the upper margin, and expose the minute seeds lying, as it were, in a trough formed by the spreading of the sides of the capsule.

In some species the base is broader (e.g., *Didissandra quercifolia*, Ridl., *Didymocarpus cœruleus*, Ridl.), and tapers gradually to the apex. During rain the drops of wet collect in the upper part of the trough and run down to the point, sweeping the seeds before them, so that they are washed out of the trough and borne away over the rocks. As in most of the small-seeded rock plants of the wet jungles, the seeds are reticulate or roughened by processes, so that they adhere to the stone surfaces or in crevices, and are not washed down the streams and carried into the low country, as would be the case were they smooth and rounded.

The *Heterobœa* section of *Didymocarpus* (*D. crinita*, Jack, *D. platypus*, C. B. Clarke, &c.) are much more widely distributed, not only throughout the peninsula, but also beyond into Sumatra and Borneo. They usually inhabit the thicker jungles, where they grow upon the soil rather than on rocks.

To sum up the distribution of the whole, as far as is known, of 72 species, no less than 53 are endemic, but five occur also in Burma and Siam, and 13 in the islands of the Malay Archipelago.

ÆSCHYNANTHUS LONGIFLORA, *DC. Prod.*, ix. p. 262.

On trees overhanging streams. Tahan River, Pahang.

The calyx is much more pubescent than is shown in the figure in the 'Botanical Magazine,' t. 4328.

Æ. SPECIOSA, *Hook.*, *Bot. Mag.*, t. 4320.

Rare. Tomoh, Legeh Province (*Machado*). Bukit Hitam, in Selangor (*H. J. Kelsall*).

It is also a native of Java and Borneo.

Æ. PERAKENSIS, sp. nov.

Caules crasse lignosi, bipedales, teretes. Folia coriacea, lanceolata, acuminata, 3–7 poll. longa, 1–2 poll. lata, carinata, canaliculata, enervia. Flores fasciculati, terminales, speciosi, pedicellis ferme $\frac{1}{2}$ poll. longis. Bracteæ $\frac{1}{8}$ poll. longæ, subulatæ. Calyx *glaber, laciniis linearibus distantibus vix $\frac{1}{4}$ poll. longis.* Corolla rubra curva bipollicaris, *parce pubescens*, lobis brevibus oblongis obtusis. Stamina longe exserta, curva, *glabra.*

Perak, on Gunong Hijan; Thaiping Hills, at an altitude of 5,000 feet.

This is allied to *Æ. longiflora*, DC., but differs in its very short smooth calyx lobes and subglabrous corolla and glabrous stamens. I have not seen the fruit.

ÆSCHYNANTHUS MARMORATA, *T. Moore, in Paxt. Flow. Gard.*, iii. (1852–53) p. 56.

Siam, Bangtaphan, an epiphyte in earthy hollows in reclining trees (*Dr. Keith*); Lankawi, on Gunong Raya (*Curtis*, 2142); Penang, on Government Hill.

This is also more abundant at Mergui than in Penang, according to Mr. Curtis. It has long been known in cultivation, being the *Æ. zebrina* of Van Houtte's Cat. (1851).

Æ. MOTLEYI, *C. B. Clarke, in DC. Monogr. Phan.*, v. p. 20.

Singapore, common, Choa Chu Kang, Kranji, Selitar; Perak, Tea Gardens, Thaiping Hills.

This also occurs in Borneo, Sumatra, Celebes, and Ceram. It forms large tufts in trees in the jungles, especially near water. The stems hang down, and are purple in colour. The leaves are green above and bright pink beneath, with purple petioles. The calyx is deeply cleft, and the narrow lobes are as long as the corolla, and dark brownish purple. The corolla much resembles that of the preceding in colouring, being light green with a brownish purple bar within the margin, and a similarly coloured central line in the centre of each lobe. The stamens are brown. The capsule is slender, and 8 inches in length. The seeds cylindric brown, with a number of hairs at the hilum end and a single one at the apex. The leaves vary very much in shape, sometimes ovate and sometimes narrowly lanceolate acuminate at both ends.

Æ. (§ HOLOCALYX) RHODODENDRON, sp. nov.

Caules pedales vel longiores, validi, glabri. Folia crassa, *ovata, acuminata*, 2 poll. longa, $1\frac{1}{2}$ poll. lata, carnosa, evenosa, carinâ crassâ elevatâ. Flores magni, speciosi, axillares vel terminales, plures, pedicellis $\frac{1}{2}$ pollicaribus, omnino glabri ore corollæ excepto. Calyx *tubulosus*, pollicaris, atropurpureus, lobis subacutis $\frac{1}{8}$ poll. longis. Corolla *extus glabra*, 3 *poll. longa*, rubra, superne dilatata, curva, lobis oblongis obtusis $\frac{1}{2}$ pollicaribus pubescentibus inferioribus a striis tribus atris ornatis.

Stamina vix exserta, corollæ lobos vix superantia filamentis pubescentibus. Capsula cylindrica, 4 pollicaris, in gynophoro bipollicari gracili posita. Semina minuta, *scabra, breviter monotricha.*

Perak, Gunong Hijan, alt. 5,000! Plus River (*Wray*!)

A beautiful and showy plant with flowers like those of some Malayan Rhododendron. The capsule is borne on a long gynophore. The seeds very much resemble those of *Æ. microtricha*, C. B. Clarke, in DC. Monog. Phan., v. t. 3, they are brown, and bear short processes on the edge, and on a keel which runs down one side, and also on the opposite face; the ends are drawn out into thin white linear acuminate processes.

ÆSCHYNANTHUS LOBBIANA, *Hook., Bot. Mag.*, t. 4260.

The commonest species in the peninsula, growing upon trees in wet jungle.

Singapore, abundant, Kranji, mangrove swamps, Chan Chu Kang; Johore, Tana Runto, Jambu Larang (*Feilding*); Malacca, Mt. Ophir, Ayer Panas; Perak, Thaiping Hills, up to 5,000 feet altitude; Pahang, Kwantan; Lankawi, Gunong Raya (*Curtis*); Kedah, Kedah Peak, 4,000 feet; it is also a native of Borneo.

The form of the leaves varies a good deal as does their texture. The plants from the mountains such as Kedah Peak Mt. Ophir, and the Thaiping Hills, have much thicker and fleshier leaves, but I can hardly separate this form specifically.

Æ. RADICANS, *Jack, in Trans. Linn. Soc.*, xiv. (1823) p. 43.

Less common than the last and more often to be found on rocks, though it also grows on trees overhanging streams.

Singapore, Kranji, mangrove swamps; Bukit Timah, on rocks; Malacca, Sungei Rambei, Selandor; Pahang, Tahan River.

Also occurs on the Island of Lingga (*R. W. Hullett*); Borneo (*Haviland*); Sumatra, and Java.

Æ. OBCONICA, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 50.

On trees in dense wet jungle.

Johore, Simpai, Ulu Batu Pahat (*Kelsall*), Tangong, Kopang; Selangor, Kwala Lumpur; Perak, Batu Kuran (*Curtis*), Tea Gardens, Thaiping Hills, and Pangkore, in the Dindings.

As in *Æ. Lobbiana*, Hook., the foliage is very variable, the leaves are sometimes narrowly lanceolate, 1½ inches long by ½ inch wide, and sometimes more coriaceous and ovate 2½ inches long by 1½ across. The calyx is dark red, the corolla as brilliant as that of *Æ. Lobbiana*, Hook.

ÆSCHYNANTHUS WALLICHII, *R. Br. in Benn., Pl. Jav. Rar.*, p. 116.

On trees in thick jungle.

Singapore, not rare, Chan Chu Kang, Kranji, Bukit Mandai; Malacca, Mt. Ophir (*Lobb*); Sumatra (*Korthals*); Borneo, on Matang Hill.

The corolla is dark red, the calyx green.

Æ. HILDEBRANDII, *Hemsl. ex Hook. f., Bot. Mag.*, t. 7365.

On the upper branches of a lofty tree, near the top of the Thaiping Hills, in Perak (June, 1893). The single specimen I obtained differed from the plant cultivated at Kew, in being more elongate and shrubby, rooting along the branch, but it appears to be otherwise identical.

AGALMYLA STAMINEA, *Blume, Bijdr.*, p. 767.

Perak, Larut Hills, common on trees, twining round the stems; also a native of Java.

A beautiful scarlet-flowered creeper. I have seen a large brown sunbird visiting the flowers and probably fertilizing them.

DIDISSANDRA FRUTESCENS, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 67.

On banks at about 1,000 feet and upwards.

Penang Hill (*Curtis*); Perak, Thaiping Hills!; Malacca (*Griffith*); also a native of Sumatra.

D. sp.

I met with another fine species of this genus and of the same section (§ *Cyrtandroides*), in the woods of Gunong Panti, in Johore. It had fine crimson flowers; unfortunately all the flowers seem to have been lost, so I defer describing it.

The following four plants have quite the habit of some of the larger flowered *Didymocarpi*, but they have four complete stamens instead of two, and if *Didissandra* is to be retained as a genus for all *Didymocarpi Didynamæ*, these should be included therein, but they have no other connection with the others in the genus.

DIDISSANDRA FLAMMEA, sp. nov.

Caulis bipollicaris, pubescens, vix lignosus. Folia congesta, ad apicem *oblonga, obtusa, superne lucida,* cinereo viridia, glabra, margine et nervis elevatis subtus hispidulis, 4 poll. longa, 1¼ lata, petiolo pubescente brevi. Scapus erectus, validulus, 3 pollicaris, *pauciflorus,* purpureus, hispidus. Flores *penduli, speciosi, pubescentes.* Calyx lobis anguste lanceolatis acuminatis viridibus purpureo hispidis ½ pollicaribus. Corolla *basi angustatâ subito dilatata, cylindrica,* aurantiaca, extus hispida, lobis haud recurvis brevibus rotundatis inferioribus paullo longioribus rubris. Stamina 4, 2 longiora, filamentis gracilibus teretibus superne hispidulis albis, antheris globosis. Pistillum album, pubescens, rectum, teres; stigma clavatum. Discus annuliformis, majusculus. Capsula breviuscula, cylindrica, purpurea, deflexa, 1½ pollicaris.

Legeh (*A. D. Machado*).

Two plants were brought down by Mr. Machado from the Legeh Goldmines, north of Truiganu, and cultivated in the Botanic Gardens at Singapore. The stem is soft and not at all woody; the leaves are of a curious grey-green colour, smooth and polished above, but the somewhat impressed nerves give it a bullate appearance. The flowers are of a fiery orange with darker red apices, and very handsome. There are four fertile stamens, one pair longer than the other, but both shorter than the style, the anthers of each pair are joined together by their apices, as usual they are rounded and quite regular. The pistil is straight, the distinction between ovary and style not being marked, the stigma is gradually dilated and truncate. It is a difficult plant to propagate as it has not as yet fruited; nor can it be propagated by leaf cuttings.

D. LATISEPALA, sp. nov.

Caulis lignosus, brevis. Folia in caulis apice congesta, *oblonga, oblanceolata, acuta,* inæquilatera, 7 poll. longa, 2 poll. lata vel minora, *crenato-dentata, parce hispida,* petiolis pollicaribus cum carinâ et nervis a pilis rufis longioribus tectis. Pedunculi axillares, 6 pollicares, hispidi. Flores pauci. Sepala *ovata, obtusa, brevia, glabra,* ⅛ poll. longa. Corolla pollicaris, cylindrica, apicem versus paullo dilatata, glabra, lobis brevibus rotundatis. Stamina 4, inclusa, filamentis linearibus, antheris subglobosis. Pistillum glabrum, ovario in stylum attenuato.

Stigma clavatum truncatum. Capsula *brevis, crassa, fusiformis*, ½ poll. longa.

Legeh (*Machado*).

I have only seen dried specimens of this. It is allied to *D. flammea*, Ridl., and from the same locality, but has smaller glabrous flowers, and shorter and thicker capsules. The leaves are also toothed, and usually sprinkled over with coarse hairs, while the petiole and midrib are covered with red hairs. The flowers look as if they had been purple.

DIDISSANDRA ATROPURPUREA, sp. nov.

Caulis bipollicaris, lignosus. Folia plura, in apicem congesta, lanceolata vel obovata, basibus attenuatis obscure crenata, inæquilatera 4 poll. longa 1½ poll. lata, superne glabra, subtus in nervis elevatis-hirsuta petiolo 1–1½ pollicari hirsuto. Scapi erecti, *glabri*, purpurei, biflori, 3 pollicares. Flores ferme sessiles, *bracteati;* bracteæ 2, ovatæ, ¼ poll. longæ, ⅛ latæ, purpureæ. Calyx *ferme ad basin fissus;* lobi lanceolati, acuti, ¼ poll. longi, glabri. Corolla 2 poll. longa, ½ poll. lata (sicca) e basi brevi angustâ dilatata, *atropurpurea;* lobi breves rotundati, *inferiore longiores.* Stamina 4; filamenta recta, gracilia pollicaria; antheræ oblongæ, appressæ. Stylus subæqualis, crassus, glaber. Stigma clavatum. Capsula (immatura) bipollicaris, crassa, apicem versus paullo attenuata.

Perak, Hermitage Hill, on rocks!

A very fine plant with large purple flowers, more compact and leafy than the preceding ones.

D. QUERCIFOLIA, sp. nov.

Caulis lignosus, 6-pollicaris vel minor, hispidus. Folia sæpius plura, apicem versus congesta, *lanceolata, runcinata*, basi attenuata, atroviridia, supra glabra, *subtus glauca, carinâ et nervis bruneo-hispidulis petiolo pollicari vel minore hispido*, laminâ 6–8 poll. longâ, 2 poll. latâ. Pedunculi axillares, 6-pollicares, parce hispidi. Flores 1–2, *magni citrini;* bracteæ lanceatæ, latæ, hispidæ. Calycis *lobi late lanceolati, obtusi*, virides glabri. Corolla bipollicaris e basi angustatâ *dilatato-cylindrica*, glabra, lobis brevibus rotundatis. Stamina ut in *D. flammeâ*, Ridl. Pistillum cylindricum; stigma clavatum, omnino inclusum. Capsula 3-pollicaris, glabra, teres, cylindrica.

Perak, Thaiping Hills, on banks.

Easily recognised by its oak-shaped leaves and lemon-yellow flowers. The upper part of the stem and midribs are covered with long brown hairs, but the upper surface of the leaf is smooth, and of a deep green; the backs whitish-green. The calyx lobes are unusually broad and foliaceous. The corolla is primrose yellow. The capsule splits along one edge, forming a kind of gutter from which the seeds, lying loose, are washed out and carried away by a rush of rain.

A pretty and striking plant, but very local and very difficult to cultivate.

DIDYMOCARPUS (§ HETEROBŒA) CRINITA, *Jack, in Malay. Misc.*, i. (1820) v. p. 1.

This is, I think, distinct from *D. platypus*, C. B. Clarke, the leaves are much narrower and softer, of a deep velvety green, and the flowers are almost always tinted with violet. It takes the place of the lowland *D. platypus*, in the hill districts. It is called "*Sumbong Merah*" by the natives.

Singapore (*Walker* in herb. Delessert) is probably a wrong localisation. It is common on Penang Hill, the Thaiping Hills in Perak, Tahan River Hills in Pahang, Kedah Peak, and Bukit Sulu in Sungei Ujong. It is a native, too, of Borneo (Sarawak), and Mr. Hullett collected it in Lingga.

D. PLATYPUS, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 94.

A broader-leaved, coarser plant, with rougher leaves of a light green. The flower is usually white, with yellow streaks in the throat, rarely tinted with violet. It grows in woods in the low country and is called "*Julong Rimbah*" by the natives.

It is abundant in Singapore, in Bukit Timah, Chan Chu Kang, &c., and I have it also from Gunong Pulai and Bukit Murdom, and Kampong Simpai, in Johore; from Ayer Panas in Malacca, from Bukit Tumiang in Sungei Ujong, and from Kwala Lumpur in Selangor.

D. ATROSANGUINEA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 328.

This has somewhat the habit of *D. crinita*, Jack, but with crimson flowers and a yellow throat.

It grows in woods in Pahang and Tringganu.

DIDYMOCARPUS QUINQUEVULNERA, *Ridl., l.c.*

Is similar, but with white flowers, with the lobes tipped with crimson or violet.

Native of Pahang.

D. KAMPSOBŒA, *C.B. Clarke, in DC. Monog. Phan.*, v. p. 92.

Much resembles *D. platypus*, C. B. Clarke, but has a broader and shorter flower, and a broader and shorter capsule.

It occurs in Pahang and also in Borneo.

D. INÆQUALIS, sp. nov.

Caulis lignosus, 5-pollicaris et ultra, $\frac{1}{8}$ poll. crassus, bruneo-pubescens. Folia plura, *alterna dissita lanceolata inæquilatera*, petiolata, *acuta*, *serrata*, basi attenuata, *superne velutina*, subtus pubescentia (siccata), superne fusca, subtus brunea, 5 poll. longa, $1\frac{1}{2}$ pollices lata, vel minora; petiolus pubescens, $\frac{1}{2}$ poll. longus. Pedunculi axillares, $1\frac{1}{2}$ pollicares, pubescentes. *Flores in cymâ congesti*, magni, cærulei, brevissime pedicellati. Bracteæ linearis, ferme $\frac{1}{4}$-pollicares. Calyx $\frac{1}{8}$ poll. longus, pubescens, *campanulatus*, lobis *breviter liberis linearibus*. Corolla pollicaris cærulea, tubo basi gracili apicem versus dilatato, *lobis brevibus rotundatis*. Stamina 2, filamentis gracilibus longiusculis, antheris oblongis. Ovarium elongatum, cylindricum. Stylus longus, gracilis, in stigma obconicum attenuatus. Capsula cylindrica, glabra, $1\frac{1}{2}$ poll. longa, apice acuminata.

Kedah, Gunong Chinchang, Sept. 1890 (*Curtis*, 2568). Flowers blue.

This is allied to *D. crinita*, Jack, but has much softer and less pubescent leaves, alternate and not crowded at the top of the stem as in that species. The calyx is very small in comparison with the corolla, and the lobes of the latter are much shorter and more incurved, resembling those of *Didissandra flammea*, mihi, and allied species. The leaves are very inæquilateral, one side of the lamina extending nearly $\frac{1}{4}$ inch below the other.

D. (Sectio HETEROBŒA) caulis elongatus. Folia dissita. Flores minores, tubo longo.

D. ALBO-MARGINATUS, *Hemsl. in Journ. Bot.*, xxv. (1887) p. 204.

Perak, Thaiping Hills; abundant.

A pretty plant about a foot high, with a purple stem, dark green leaves with white edges and veins, and an erect peduncle bearing four or five nodding flowers, pinkish white outside and yellow within, with darker streaks in the throat. The stamens are white, with filaments gradually dilated in the middle; there are also two rudimentary filaments hooked at the end.

DIDYMOCARPUS HISPIDA, sp. nov.

Caulis 6-pollicaris vel altior, *hispidus*. Folia ovata aut lanceolata, petiolata, 3 poll. longa 1 poll. lata, subacuta, basi angustata, viridia, *superne scabrida, subtus nervis et carinâ elevatis, margine hispidis;* petiolus $\frac{1}{4}$-pollicaris. Pedunculi 1–2 erecti, 3 pollicares, hispidi. Flores 3–4, *terminales, cymosi, pedicellis hispidis* $\frac{1}{2}$ pollicaribus. Bracteæ lineares $\frac{1}{4}$ pollicares. Calyx $\frac{1}{4}$ pollicaris lobis lanceolatis hispidis. Corolla pollicaris *glabra alba* in labio inferiore violaceo-striata, lobis superioribus ovatis subacutis, inferioribus longioribus, tubo recto. Stamina filamentis gracilibus ferme rectis haud incrassatis, antheris longiusculis, filamentis abortivis breviusculis clavatis 2. Pistillum pubescens, ovario fusiformi. Stylus distinctus teres. Stigma capitatum. Capsula $1\frac{1}{2}$ pollicaris, recta, cylindrica.

Perak, Thaiping Hills, Gunong Hijan (*Curtis* 2037).

This species only occurs in the upper part of this hill. It is a rough hispid plant, with fairly large white flowers streaked with violet in the throat. The flowers are clustered on the top of the peduncle, not racemose as in the preceding, and there are sometimes additional branches springing from the terminal cluster. The stamens lie in the flower to one side of the stigma, which does not pass through them or behind them as in many species.

D. FLAVA, sp. nov.

Caulis pedalis, *scabridus*. *Folia* 3 poll. longa $1\frac{1}{2}$ poll. lata, *lanceolata, acuta*, basi attenuata, *denticulata, scabrida*, subtus nervis elevatis pilis brevibus appressis tectis, petiolis $\frac{1}{2}$ pollicaribus. Cymæ axillares et subterminales; *pedunculi hispiduli* 1–2 pollicares; pedicelli $\frac{1}{2}$-pollicares. Cyma 4–5-flora. Calyx brevis *lobis hispidulis lanceolatis* subobtusis. *Corolla* $\frac{3}{4}$-poll. longa *glabrescens, flava*, tubo longo lobis breviusculis obtusis. Stylus gracilis, cum ovario cylindrico pubescens. Capsula $1\frac{3}{4}$ pollicaris *teres, hispidula.*

Perak, Thaiping Hills, to 6,000 feet alt.

Easily distinguished by its leaves, rough with short appressed hairs on the veins beneath, and scabrid with minute papillæ elsewhere, and by its yellow flowers.

DIDYMOCARPUS CITRINA, sp. nov.

Planta debilis habitu *D. cordatæ*. Caules virides, debiles, circiter pedales, albo-pubescentes. Folia *mollia, ovata vel ovato-lanceolata, crenulata, velutina*, nervis 5–6 impressa, petiolis 3-pollicaribus angulatis. Paniculæ *axillares*, 3-pollicares, basi pubescentes, superne graciles, glabræ. Pedicelli $\frac{1}{2}$–1 pollicares teretes, glabri. Bracteæ *cordatæ, ovatæ acutæ, ferme amplexicaules, politæ, virides, rubro-marginatæ*. Calycis *lobi triangulares, stellatim patentes, glabri, rigidi*, virides rubro-marginate. Corolla *citrina* dependens; tubus pollicaris *infundibuliformis*, basi angustato ore $\frac{1}{2}$ poll. lata, dilatata lobis superioribus late rotundatis brevibus recurvis, inferioribus majoribus. Stamina inclusa, antheris subtriangularibus, filamentis sinuatis glabris. Pistillum teres, validulum, apice angustatum, pubescens, $\frac{1}{2}$ pollicare. Stigma peltatum. Capsula pollicaris, gracilis.

On rocks on Kedah Peak, alt. 3,000 feet.

A weak herb of the habit of the weak form of *D. cordata*, Wall., but with trumpet-shaped flowers, somewhat resembling those of *D. longipes*, C. B. Clarke. It is allied to the following.

D. CORCHORIFOLIA, *Wall. List*, n. 792; *R. Br. in Benn., Pl. Jav. Rar.*, p. 119.

Penang, Moniot's Road (*Curtis*, 1239).

D. PURPUREA, sp. nov.

Caulis 12–18-pollicaris, pubescens. Folia rigidiora, *velutina, ovata, crenulata, acuta*, inæquilatera, 4 *poll. longa*, 2 poll. lata, petiolo $\frac{1}{4}$–$\frac{1}{2}$-pollicaris. Pedunculus erectus, terminalis, 3-pollicaris, glaber. *Panicula stricta*, 4-pollicaris, ramis gracilibus. Bracteæ *parvæ, ovatæ*. Calyx *stellatim patens*, lobis ovatis glabris brevibus. Corolla pollicaris *tubulosa*, basi angustata, faucem versus dilatata, *purpurea*, lobis obtusis, inferioribus longioribus. Stamina 2, inclusa. Capsula stipitata, $\frac{1}{2}$ pollicaris, glabra, cylindrica.

Kedah, Gunong Chinchang, 1,000–1,500 feet alt., September, 1890 (2567) Curtis (v. sicc.).

This is near *D. citrina*, Ridl., but has firmer, larger, velvety leaves, a more strict panicle and claret-coloured flowers.

Didymocarpus violacea, sp. nov.

Rhizoma breve. Caulis pollicaris, *dense lanuginosus.* Folia plura, valde inæqualia, *ovata vel lanceolata acuta, obliqua, dentata,* sessilia vel petiolata (petiolo bipollicari) *dense molliter hispidula* subtus nervis exceptis glabriora 2–8 poll. longa 1¼–2½ poll. lata, basin versus attenuata. Paniculæ *laterales,* 2–5 pollicares, *laxæ,* ramis gracilibus parce pubescentibus. Flores *plures, violacei,* mediocres. Calycis lobi oblongi lanceolati ⅛ - pollicares, virides, glabri. Corolla tubulosa, dilatata, obliqua, ½ poll. longa, violacea, lobis superioribus oblongis erecto - recurvis breviusculis, *inferioribus ¼ poll. longioribus.* Stamina 2, filamentis tenuibus gracilibus glabris haud dilatatis. Pistillum longum, stylus multo brevior ovario elongato tereti. Stigma clavatum. Capsula glabra, cylindrica, ¾ pollicaris.

Perak, Hermitage Hill, alt. 5,000 feet, on rocks in a stream (2909).

A tufted plant with a short rhizome and densely softly hairy foliage and short lax panicles of pretty violet flowers darkest at the mouth. The corolla is trumpet-shaped and curved, the lower lip being much the longest.

D. pyroliflora, *Ridl. in Trans. Linn. Soc.,* Ser. II. (*Bot.*) iii. (1893) p. 330.

Pahang.

May perhaps be referred here temporarily. The habit is that of the group, but the flowers are bell-shaped and short, with the style far exserted.

D. flavobrunnea, *Ridl., l.c.,* p. 329, belongs to the same section.

Pahang, Tahan River Woods.

D. longipes, *C. B. Clarke, in DC. Monog. Phan.,* v. p. 86.

This is common on Mt. Ophir, and is classed by Mr. Clarke with *Didymanthi.* It is difficult to find any species really nearly allied to this. It has a stout, often short, woody stem and large obovate or spathulate leaves at the top in a rosette, deep green above and purple beneath, and pendent lemon-yellow flowers. Calyx and peduncle purple with lateral stamens with short filaments. The corolla is pubescent. The flowers are quite those of *D. albo-marginata,* Hemsl. It inhabits the rocky dry woods a little below Padang Batu, on Mt. Ophir, and also on the other spur of the same range known as Gunong Mering.

Sectio Kompsobœa.

This section contains a number of small allied species with short stems and congested leaves, and distinctly though often shortly tubular flowers, but *D. Kompsobœa*, C. B. Clarke, with its large solitary flowers so closely resembling *D. platypus*, C. B. Clarke, which is referred to *Heterobœa*, appears to me out of place with such plants as *D. bullata*, C. B. Clarke, and *D. reticulosa*, C. B. Clarke. I think a good section can be formed of these small species, of which there are a number in Borneo and a few in the mountain woods of our peninsula. Among them I would include *D. heterophylla*, Ridl., from Pahang, which has also been collected on Gunong Junong, in Johore, by Lieut. Kelsall, and the following, which, however, has a thicker tapering capsule and a flower more like that of *D. semitorta*, C. B. Clarke.

Didymocarpus puncticulata, sp. nov.

Subacaulis. Folia congesta, *elliptica vel obcuneata* vel ferme oblanceolata, *petiolata*, inæquilatera, basi truncata, *crenata*, *hispida*, 3 poll. longa 1½ poll. lata vel minora, nervis subtus elevatis hispidis; petiolis ½–1½ poll. longis hispidis. Pedicelli axillares gracillimi 3-pollicares, in fructu sæpe incrassati, hispiduli. Calycis lobi lanceolati, acuti, $\frac{1}{16}$ poll. longi, hispiduli. Corolla ¼ *pollicaris, extus hispida violacea*; labium inferius obliquum longius, lobis oblongis obtusis. Stamina filamentis crassis oblongis brevibus, *antheris conicis scutiformibus magnis*. Stylus gracilis, longior, pubescens. Capsula ½-pollicaris, *crassiuscula*, superne dehiscens, hispidula, placentis hispidis. Semina minuta fusiformia oblonga, cylindrica, reticulata.

Johore, on Gunong Panti, on rocks (December, 1892).

This differs from *D. heterophylla*, Ridl., in the distinctly polished hairy leaves, which are broadest towards the apex, the larger flowers with very large anthers, and the broader thicker fruits. The leaves are puncticulate all over besides being sprinkled with hairs.

D. (§ Didymanthus) laxa, sp. nov.

Caulis *brevis*, *lignosus*, *tomentosus*, pollicaris. Folia apice congesta, inæqualia, patentia, *obovata*, *crenata*, *obtusa*, *basi*

attenuata, dense hispida, ad 6 poll. longa, 3 lata, nervis distinctis petiolo plano lato. Pedunculi laterales, graciles, 6 pollicares, superne glabri. Panicula *patens, ramis tenuibus fasciculatis*. Flores explanati, albi roseo-tincti. Calycis lobi lanceati, perparvi. Corolla *distincte bilabiata, tubo brevi* ½ poll. lato, lobis 2 superioribus ovatis recurvis; labium inferius trilobum, lobis lateralibus breviter acutis medio latiore obtuso. Stamina filamentis in medio incrassatis virescentibus; antheris oblongis connatis flavis. Pistillum longius, crassum; ovarium in stylum attenuatum. Stigma parvum, capitatum. Capsula (immatura) longa tenuis pollicaris.

Lankawi (*Curtis*, 2571).

This has a short woody stem ending in a tuft of leaves, dark green with large crenulations. The flowers are very short tubed and spread widely, and are distinctly bilabiate. They are white or pale lilac.

DIDYMOCARPUS (§ REPTANTES) REPTANS, *Jack, in Malay Misc.*, i. (1820) v. p. 3.

Penang, Pulau Butong (*Curtis*, 1706). Also collected in Penang by Wallich, Lobb, and others; and in Java by Zollinger.

Var. MONTICOLA, *Ridl.* *D. producta*, C. B. Clarke, in DC. Monog. Phan., v. p. 96.

Gracilior, longius repens, 1½ pedalis vel ultra. Folia lanceolata, acuta, basi in petiolum attenuata, 2 poll. longa, ⅜ poll. lata, ciliis longioribus sæpissime rufescentibus.

Perak, Larut Hills, 1–2,000 feet alt. Lumut, in the Dindings, Hermitage Hill.

Sungei Ujong, Bukit Tumiang, Bukit Sulu.

Also Sumatra (*Horsfield*, in Herb. Brit. Mus. !).

A very different looking plant, often growing in masses on banks. The shoots are covered with a dense mass of hairs of a reddish colour when dry, and the whole plant is more straggling and has very narrow leaves. In one plant the leaves are glabrous except the edges and midrib, and the flowers also vary much as to indumentum.

The two plants *D. reptans*, Jack, and *D. producta*, C. B. Clarke, however, pass into each other, and are, I think, mere forms.

It is called "*Rugum Bukit*," "*Bunga Jarom Bukit*," and

"*Akar Sumpuh Darat*" (*i.e.*, dysentery creeper), a decoction of the roots being used for that disease.

DIDYMOCARPUS MARGINATA, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 96.

Malacca. In woods on the slopes of Mt. Ophir (n. 3185). Also collected by Lobb in Malacca.

Flowers purple and white.

D. ASCENDENS, sp. nov.

Caulis *ascendens*, superne sericeus pauci-ramosus, 4–6 pollicaris, ramis 2 poll. longis. Folia ramorum apices versus *plerumque congesta, ovata, integra, subacuta*, basi acuminata petiolata, atroviridia *sericea*, margine albo sericeo, laminâ 1½ poll. longâ, 1 poll. lata, petiolo pollicari (in foliis inferioribus), superne minore. Flores *aurantiaci in axillis terminalibus solitarii*, pedicellis ¾ pollicaribus sericeis, bracteis ⅛ poll. longis linearibus sericeis. Sepala *libera linearia* acuminata sericea. Corolla tubulosa superne dilatata pubescens, lobis subæqualibus rotundatis. Stamina 2 filamentis longis crassis undatis, glabris, antheris triangularibus obtusis. Pistillum pubescens, ovarium cylindricum in stylum longum attenuatum, stigma ovato-triangulare. Capsula non visa.

Perak, at Tapa (*Dr. Haviland*).

This has a prostrate stem, rooting at intervals, the upper part ascending. The leaves are crowded on the ends of the spreading branches, and a few rather larger with longer petioles grow in pairs beneath the branches. Stem and leaves are covered with a white, silky pubescence, which is longest on the younger parts and on the edges of the laminæ. The flowers are long for the size of the plant, with a somewhat slender tube dilated above; they are rather short stalked.

In habit I do not know any species exactly like this.

D. (§ LOXOCARPUS) SEMITORTA, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 99.

Malacca, on Mt. Ophir. Abundant on the rocks in streams. The flowers are pale violet or white, with darker streaks in the throat.

D. (§ LOXOCARPUS) INCANA, *Benth. and Hook. f., ex C. B. Clarke, in DC. Monog. Phan.*, v. p. 98.

Penang Hill, on rocks.

"Singapore, Lobb in Herb. Kew," is evidently an error.

Lobb doubtless got the plant at Penang, where it is common. The flowers are pale blue.

Didymocarpus (§ Loxocarpus) sericea, sp. nov.

Herba pusilla, subacaulis. Folia *plura lanceolata, acuta*, petiolata sericea, laminâ 1 poll. longâ, $\frac{1}{4}$ poll. latâ, petiolo $\frac{1}{2}$ pollicari. Scapi *graciles, bipollicares, sericei*, floribus 2–3 apicalibus parvis. Bracteæ sericeæ, $\frac{1}{8}$ pollicares. Pedicelli graciles, $\frac{1}{4}$ pollicares. *Flos* $\frac{1}{8}$ poll. longus, *campanulatus*, minute pubescens, *subregularis*. Stamina filamentis breviusculis, antheris ovoideis crassis. Stylus *longus*, tenuis, $\frac{1}{4}$ pollicaris, corollam superans. Capsula *brevis, lanceolata, recta, glabra*, $\frac{3}{8}$ poll. longa, pedicello incrassato elongato.

Lingga (*Native collector!*) (*R. W. Hullett;* v. sicc.).

A small, tufted plant, with narrow, silky leaves and very small flowers. The style is longer than the corolla, which is unusual. The capsule is like that of *D. incana*, but narrower, smaller, and glabrous.

D. (§ Loxocarpus) cærulea, sp. nov.

Fere acaulis. Folia *plura, ovata, basi cordata* inæquilatera subacuta, *longe petiolata*, petiolis ad 8 pollicaribus pubescentibus, laminis cordatis ovatis denticulatis ad 6 poll. longis 4 poll. latis superne sericeis, subtus tomentosis nervis conspicuis elevatis. Pedunculi *usque ad pedales* hispiduli, *viscidi;* cymæ *sæpe compactæ*, viscidæ. Flores plures, bracteis lanceolatis angustis. Calycis lobi lanceolati angusti, corollæ tubo breviores. Corolla $\frac{3}{8}$ poll. longa et lata, cærulea (ore violaceo) pubescens bilabiata, lobis superioribus oblongis obtusis, inferioribus truncatis medio longiore, tubo brevi lato campanulato. Stamina exserta *filamentis* in medio subito incrassatis flavis *sigmoideis*, antheris connatis atro-violaceis. Ovarium breve, crassum, oblongum; stylus tenuis; stigma parvum. Capsula $\frac{3}{8}$–$\frac{1}{2}$ pollicaris, lanceolata sursum curva acuta viscida.

Perak, Larut Hills; abundant at 5,000 feet alt. Selangor, Bukit Hitam (*Kelsall*).

A very beautiful plant covering the rocks. The leaves are gray, silky, and very soft; the flowers in tall peduncles, in cymes often compact; the whole head of flowers being viscid from glandular hairs. The flowers are pale cobalt blue, with a darker, more violet, eye. The stamens are bent sigmoidly and swollen at the point where they emerge from the tube, the

upper and lower portions being slender, and white. The capsule is boat-shaped, the apex curved up, and, like the rest of the flower, it is covered with glandular hairs.

The plant varies very much in size. It is allied to *D. incana*, Benth. and Hook. f., but that has much shorter, almost ovate, fruit.

DIDYMOCARPUS (§ DIDYMANTHUS) CORDATA, *Wall. List*, n. 781, *R. Br. in Benn., Pl. Jav. Rar.*, p. 119.

Penang Hill, Perak, Maxwell's Hill, Thaiping; abundant.

A rather tall plant, with a spreading panicle of white or violet tinted flowers; inhabiting rocks.

Var. DEBILIS, var. nov.

Rhizoma carnosum. Caules debiles, 6 pollicares, pubescentes. Folia *tenuia, ovata,* basi obtusa, obliqua, crenato-dentata, acuta vel subacuta, sparse hispida, 1½–4 poll. longa, 1–2 poll. lata, petiolo tenui pollicari. Scapus 4–6 pollicaris glaber, debilis. Panicula *parva, pauci-ramosa,* ramis tenuibus brevibus. Bracteæ *ovatæ.* Flores albi iis formæ typicæ minores.

Kedah Peak, on rocks.

Var. OPHIRENSIS, var. nov.

Elata, debilis. Folia *tenuia, lanceolata subacuta* vel acuta, basi attenuata, 6 poll. longa, 2 poll. lata. Panicula debiles, erecta, glabra, ramis tenuibus glabris, *bracteis lanceolatis.* Flores albi, quam in formâ typicâ minores.

Malacca, on Mt. Ophir, on a big cliff in the jungle.

These two varieties seem peculiar to these two spots. I never saw the typical large form with them. Both localities are damp cliffs in thick wet jungle, and in both forms the plant is weaker, thinner, less pubescent, and smaller flowered than the Perak one.

D. (§ SALICINI).

Of these small, short flowered species with narrow willow leaves crowded at the top of a short woody stem, I have three from the peninsula, viz. :—

D. SALICINA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 329. With very small pink flowers; from the Tahan River.

D. PECTINATA, *C. B. Clarke, ex Oliver, in Hook., Ic. Pl.*, t. 2246. With white flowers; from Perak and Selangor, where it has lately been found by Mr. Kelsall.

Also another species with quite entire leaves, winged to the base of the petiole and ferruginously woolly peduncles, of which I have not yet seen flowers, from Gunong Janeng, in Johore, where Mr. H. J. Kelsall collected it.

DIDYMOCARPUS LILACINA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 330.

May from the form of its flowers have some affinity with the *Salicinæ*. I do not know any other plant really near it.

D. (§ SALICINI) DENTATA, sp. nov.

Caulis 6-pollicaris, gracilis, lignosus, basi longe nudus. Folia apicem versus congesta, *linearia vel lineari-lanceolata*, angusta, *longe acuminata, serrata (dentibus longis)* 6 poll. longa, $\frac{1}{4}$ poll. lata vel minora, glabra. Pedunculi graciles, rubri, pubescentes, 2-pollicaris, pauciflori. Flores parvi, lilacini, $\frac{1}{4}$ poll. longi. Sepala *linearia pubescentia*, cum $\frac{1}{3}$ parte corollæ æquilonga, libera. Corolla campanulata, brevis, lata, lobis brevibus. Stamina 2, filamentis crassiusculis latis rectis, antheris pro flore magnis. Ovarium cylindricum in stylum longum exsertum curvum attenuatum, glabrum. Capsula $\frac{3}{8}$ pollicaris, gracilis acuminata recta.

Lingga (*R. W. Hullett*).

A very pretty little plant with the leaves much less deeply cut than *D. pectinata*, C. B. Clarke, to which it is allied. The leaves are narrowed at the base, dilating towards the middle, and ending in a long tapering point, they are edged with narrow teeth $\frac{1}{8}$ of an inch long, pointing forwards. The nerves run to the lower edge of the teeth.

D. REGULARIS, sp. nov.

Caulis $1\frac{1}{2}$ poll. longus, glaber, lignosus. Folia, *apice congesta*, valde inæqualia, *oblonga lanceolata, obtusa*, inæquilatera glabra *crenulata*, impressivenia, atroviridia, lucida, purpurea minute tomentosa 3-poll. longa, $1\frac{1}{2}$ poll. lata, nervis subtus elevatis, petiolo $1\frac{1}{2}$ pollicari bruneo-tomentoso. Pedunculi axillares, pollicares, graciles, pubescentes foliis breviores. Panicula *compacta, parva*, pauci-ramosa, ramis brevibus. Flores per parvi, albi, brevissime pedicellati. Calyx *tubo corollæ æquilongus*, laciniis lanceolatis bruneo-tomentosis. Corolla vix $\frac{1}{4}$ poll. lata, *lobis oblongis obtusis æqualibus.* Stamina 2, *filamentis sigmoideis* crassiusculis albis, antheris rotundatis ovoideis flavis appressis. Pistillun album; ovarium cylindricum; stylus arcuatus validulus; stigma parvum, capitatum. Capsula ½-pollicaris, teres, scabrida.

Lankawi (*C. Curtis*, v.v.).

A very curious little plant, with a readily branching stem, polished dark green leaves, with the nerves all impressed so as to give them a reticulate appearance, and numerous short peduncles, bearing very short panicles of very small snow-white flowers with a very short tube and perfectly regular limb; all the lobes being equal in length and rounded at the apex. I can refer it to no section.

CHIRITA, *Buch.-Ham.*

It is by no means easy to separate this genus from *Didymocarpus* except by the (often obscurely) lobed style. The species included, like those of the genus *Bœa*, are almost all natives of limestone rocks.

C. CALIGINOSA, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 122.

Selangor, on the limestone rocks at Kwala Lumpur; Beccari's locality is said to be Klang, but from the nature of that country it is probable that this is an error, especially as some other plants which grow with this plant (*e.g.*, § *Monophyllæa*) are also recorded from Klang. The flowers are of a beautiful azure blue.

C. VIOLA, sp. nov.

Herbacea, 2–10 pollicaris, pubescens, caule purpureo. Folia inæqualia, 2–6 poll. longa, 1½–3 poll. lata, ovata, crenata vel serrata, vel ferme integra, acuta, petiolo ⅛ pollicari. Cymæ *breves, pauciflore.* Flores *parvi*, violacei, pedicellis ½-pollicaribus. Calyx ferme ¼ pollicaris, lobis æqualibus lanceolatis acutis hispidis. Corolla ¾ pollicaris, pubescens, limbo ½ poll. lato, tubo basi angusto, tunc dilatato, lobis superioribus brevibus rotundatis, inferioribus majoribus ovatis obtusis, medio longiore, elliptico, violaceis striis obscurioribus; fauce *in labio superiore a pilis glandulosis flavis munito.* Stamina 2, paullo exserta, filamentis crassiusculis; antheris flavis, ovoideis, connectivo incrassato, maculâ nigrâ in medio utriusque loculi, basibus ciliatis. Ovarium in stylum attenuatum, pubescens. Stigma oblique bifidum, lobis linearibus obtusis.

Capsula teres, acuta, stylo terminata, 1½ poll. longa, minute pubescens.

Siam, Bangtaphan, in recesses of the rock, Buddhists' Cave (*Dr. Keith*).

Lankawi (*Curtis*, n. 2570).

I have had this under cultivation for some time. The plant lives only till it has flowered, and then dies down, but is easily reproduced by seeds. It is usually very small, but may attain a height of 4 inches. The flowers are exactly the colour of those of a violet, and from a front view quite suggest its appearance. The corolla is narrowly tubular at the base and somewhat abruptly bent, where it dilates into a trumpet shape. The lobes are most unequal, violet, with a yellow eye, and darker streaks radiating from it. The eye is formed by a large number of curiously-shaped trichomes, narrow at the base, then gradually swelling out in the middle, and tapering again to the end, where they terminate in a glandular body. The stamens are attached at the mouth of the corolla tube, so that they project beyond it. The anthers have the connective carried along the back in the form of a rounded keel, there is a black spot on each of the loculi; the base of the anther is furnished with white hairs.

The Lankawi specimens are much more drawn up than those I have under cultivation in Singapore, and more branched.

Chirita mollissima, sp. nov.

Subacaulis. Folia congesta, *lanceolata, acuta, minute obscure serrata, argenteo-tomentosa*, 6–8 poll. longa, 1¼–2 poll. lata. Flores pedicellati, nutantes, axillares, paucæ, *speciosæ*, pedicellis pollicaribus crassiusculis lanatis. Sepala lanceolata, acuminata, æqualia, ½ poll. longa, tomentosa. Corolla *infundibuliformis ultra pollicaris*, oblonga, obtusa, lobis superioribus breviusculis rotundatis violaceis, inferioribus latioribus medio longiore tubo et fauce albo, *pilis glandulosis supra antheras* sitis. Stamina 2, filamentis latis curvis, antheris latis crassis. Pistillum pubescens, smaragdinum, paullo exsertum, ovario cylindrico in stylum attenuato; stigma bilobum, pubescens, decurvum. Capsula pollicaris, lata, crassa, glabra, vel pubescens.

Siam, Pungah (*Curtis*, n. 2944).

Under the same number, I have from Mr. Curtis a somewhat similar plant with a well-developed stem, with rather remote leaves, and a long, slender capsule, pubescent, but not ripe. This may be a distinct species, but the flowers appear similar, and Mr. Curtis thinks it is identical.

CHIRITA ? ELATA, sp. nov.

Planta 2-*pedalis.* Caulis hispidus, angulatus, ramosus. Folia 3–6 poll. longa, 1½–3 poll. lata, *ovata*, inæquilatera, *acuta, denticulata, petiolata, dissita, hispidula* nervis elevatis hispidioribus, petiolis gracilibus pollicaribus. Paniculæ *laterales*, patentes, *pauci ramosæ*, 3-pollicares, ramis hispidulis. Flores mediocres, purpurei. Sepala lanceolata acuminata, brevia, hispidula, ⅛ pollicaria. Corolla *infundibuliformis*, pollicaris, purpurea, ore ½ poll. lato hispida lobis brevibus rotundatis; labia subæqualia. Stamina 2, filamentis gracilibus, antheris oblongis. Pistillum pubescens. Ovarium breve, in stylum attenuatum. Capsula gracilis, recta, cylindrica (immatura).

Perak, banks on the Thaiping Hills (*H. N. Ridley*, 2911; *C. Curtis*, 2038).

Rather a coarse large plant, with axillary panicles of claret-coloured flowers. It has more of the habit of *Didissandræ* of the *D. frutescens* group, but has but two fully-developed stamens.

BŒA SUFFRUTICOSA, sp. nov.

Frutex *ramosa*, 1–2 pedalis, caulibus ⅛ poll. crassis parce arachnoideis angulatis. Folia *dissita, lanceolata, subacuta,* basi attenuata, 3 poll. longa, ½ poll. lata, *superne ferme glabra punctata* (in sicca fusca), subtus brunescentia albida arachnoidea; petioli ¼–½ pollicares. Paniculæ axillares, pollicares, ramis brevibus arachnoideis. Alabastra pallide cinnamomeo-arachnoidea. Calyx *corollæ tubo longior*, sepalis lineari-lanceolatis crassis extus tomentosis. Corolla ¼–⅓ *poll. lata,* alba, lobis brevibus oblongis rotundatis. Antheræ oblongæ obtusæ, stylus glaber, apice attenuatus curvus. Capsula *crasse fusiformis,* ¼ pollicaris, a stylo gracili æquilongo terminata.

Lankawi, on small island (*Curtis*, 2565).

This seems to form a regular small bush, very unlike the habit of any of the other species. The small white flowers and the short thick capsule half covered by the calyx are remarkable points about it.

Bœa acutifolia, sp. nov.

Caulis *lignosus*, 3 pollicaris vel ultra, ¼ poll. crassus, internodiis ½ pollicaribus. Folia apicem versus congesta, *oblanceolata, acuta*, basi in petiolum attenuata 6 poll. longa, 1½ poll. lata, *superne* nigricantia *punctata glabra, subtus cinnamomea arachnoidea*. Paniculæ axillares, 6 pollicares, pedunculis arachnoideis, ramis gracilibus brevibus. Sepala *tria lanceolata, acuta*, ⅛ pollicaria, arachnoidea. Capsula ¾ pollicaris, cylindrica, acuta, glabra, torta.

Lankawi, Goa Chinta (*Curtis*, 2791).

A distinct plant with rather narrow acute leaves covered beneath with a brown webby tomentum. The specimens are all in fruit.

B. verticillata, sp. nov.

Caulis lignosus, 3 pollicaris et ultra, ferme ¼ poll. crassus, annulatus. Folia *verticillata, lanceolata*, acuminata basi in petiolum attenuata, 4 poll. longa, ¾ poll. lata vel majora, *supra griseo-arachnoidea*, subtus nervis elevatis, albo-arachnoidea. Panicula *terminalis* 1½ *pedalis*; rhachis *quadrangularis* albo-arachnoidea; rami *verticillati, remoti*, 3 poll. vel minus dissiti, 4 in verticillo. Bracteæ foliaceæ ½–¼ poll. longæ. Flores plures. Sepala lanceolata subulata arachnoidea, ⅛ pollicaria. Corolla cærulea, brevituba, lobis rotundatis latis ⅜ poll. latis. Stamina filamentis perbrevibus, antheris pyriformibus. Stylus multo longior rectus. Stigma capitatum. Capsula fusiformis, ½ pollicaris, acuminata.

Selangor, on limestone rocks at Kwala Lumpur (*Kelsall*).

This has a cylindric woody stem marked with rings where the whorls of leaves have fallen off. The stem above the leaves ends in a four-angled stalk bearing distant whorls of short branches. It must be a handsome plant in flower.

B. paniculata, sp. nov.

Caulis *crassus*, a basibus foliorum delapsorum intectus 4 poll. longus et ultra, ½ poll. crassus. Folia *plurima*, apice congesta, *lanceolata, acuminata*, basi longe attenuata, 6 poll. longa, 1 poll. lata, *superne grisea arachnoidea, subtus griseo-alba*, nervis elevatis cinnamomeis. Panicula *pedalis vel longior*, ramis verticillatis 6 pollicaribus erectis bruneo tomentosis angulatis, rhachide crassâ *profunde canaliculatâ*, albo-arachnoideâ. Bracteæ ad verticillos 4–5, foliaceæ. Flores plurimi, pedicellati, pedicellis semi-pollicaribus. Sepala brevia lanceolata, pubescentia $\frac{1}{8}$ pollicaria. Corolla tubo brevissimo, *lobis rotundatis magnis*, $\frac{1}{2}$ poll. longis, *glabris* cæruleis. Stamina filamentis brevibus crassis $\frac{1}{4}$ pollicaribus, antheris $\frac{3}{16}$ poll. latis. Stylus arcuatus, $\frac{1}{4}$ pollicaris. Capsula $\frac{3}{4}$ poll. longa, crassa, a stylo $\frac{1}{2}$ pollicari terminata.

Selangor, on the limestone rocks, Kwala Lumpur (*Kelsall! Ridley*, 1970, 1976).

This is a very fine plant. Like so many other species of the genus, it has the leaves covered with an arachnoid pubescence, which has a cinnamon colour on the backs of the younger leaves on the base. The panicle is very large and the branches are arranged in whorls, the main axis is white and deeply channelled. The flowers, according to Mr. Kelsall, are of a fine blue.

BŒA LANATA, sp. nov.

Caulis *crassus*, 2 *poll. longus* vel ultra, dense *lanatus*. Folia congesta, lanceolata acuminata longe petiolata, basi in petiolum attenuata; lamina 3 poll. longa, $\frac{3}{4}$ poll. lata, superne arachnoidea, subtus albo lanata, petiolo 3 pollicari alato. Paniculæ *axillares, compactæ, pauciramosæ*, pollicem longæ; *pedunculi* 3–1 pollicares lanati. Calyx *tubo corollæ æqualis, lobis lanceolatis extus lanatis*. Corolla *tenuis* $\frac{1}{2}$–$\frac{3}{4}$ pollicaris *glabra*, rosea, lobis rotundatis. Antheræ subglobosæ; stylus crassiusculus; stigma capitatum. Capsula $\frac{1}{2}$ pollicaris, crassiuscula, valde torta, glabra.

Lankawi, near Dayong Bonting, on almost bare rocks, September, 1890 (*Curtis*, 2569), called "*Chapah*" by the natives.

A very woolly plant with comparatively thin textured rosy flowers and narrow long petioled leaves.

B. PATENS, sp. nov.

Subacaulis. Folia *rosulata, oblonga, obtusa, serrulata-crenulata*, inæquilatera, petiolata, 4–6 poll. longa, 2–3 poll. lata (petiolo pollicari) *superne molliter pubescentia subtus pallide ferrugineo-tomentosa*. Pedunculus *validus*, teres, 18 poll. altus molliter ferrugineo-lanatus, ramis *longis divaricatis bifurcatis*. Bracteæ primariæ oblongæ, $\frac{1}{4}$ pollicares, secundariæ minores. Cymulæ *scorpioideæ, paucifloræ*. Flores *parvi*, albi, $\frac{1}{8}$ poll. lati, pedicellis $\frac{1}{16}$ poll. longis. Sepala ferme ad basi libera, brevia, lanceolata, acuta, glabra. Corolla campanulata glabra, lobis 2 oblongis obtusis, 3 ovatis obtusis brevioribus et latioribus. Stamina filamentis brevibus gracilibus curvatis tubo æqualibus, antheris magnis oblongis. Pistillum glabrum ovario cylindrico in stylum gracilem paullo exsertum attenuato. Stigma parvum, vix dilatatum. Capsula $\frac{1}{2}$ pollicaris, glabra, gracillima.

Siam, Punga (*Curtis*).

A herb with a short subterranean stem and a rosette of a few soft woolly leaves, velvety above. The inflorescence appears terminal, it consists of a tall woolly stem bifurcating at the apex into two arms, about 6 inches long, which bifurcate again three times, below each bifurcation there is an additional pair of short slender branches. The flowers are quite small, and the capsule very small and slender.

BŒA GLABRA, sp. nov.

Herba *succulenta*, *glabra*, caule brevi, 1–2 pollicari. Folia *undulata*, *ovata rotundata*, inæquilatera, 6 poll. longa, $3\frac{1}{2}$ poll. lata vel majora, petiolo 1–2 poll. longo crasso: folia superiora minora opposita. Pedunculi subterminales, 3–4 pollicares, crassi. Cymæ *terminales* congestæ, *scorpioideæ* $\frac{1}{2}$ poll. longæ, pedicellis brevibus. Calyx tubo brevi conico, *lobis* 5 *æqualibus obcuneatis truncatis* ferme $\frac{1}{8}$ pollicaribus. Corolla alba $\frac{1}{2}$ poll. lata, lobis rotundatis obtusis. Stamina 2, filamentis sigmoideis basi latis superne attenuatis, antheris oblongis utrinque acutis majusculis. Stylus cylindricus, crassus, glaber, curvus; stigma vix incrassatum oblique ovatum.

Pungah, Siam (*Curtis*, 3039).

I have seen but one portion of a plant and a drawing made from a specimen which flowered in Penang Gardens. Though I have seen no fruit, there can be little doubt but that this is a *Bœa*, though a very curious one. In its succulent glabrous habit and the compact terminal scorpioid cymes, and the peculiar adze-shaped sepals, it is different from any other species known to me.

B. FERRUGINEA, sp. nov.

Acaulis vel caule crasso brevi, radicibus magnis crassis. Folia plura congesta, patula, *ovata*, *cordata obtusa*, *crenulata*, superne pilis dissitis brevibus intecta, subtus in nervis elevatis a pilis longis munita tomentosa viridia subtus pallidiora (siccata superne nigricantia subtus ferrugineo-tomentosa); lamina 3 poll. longa, $2\frac{1}{2}$ poll. lata, petiolis $1\frac{1}{2}$–2 poll. longis. Pedunculi

3-pollicares *ferrugineo-tomentosi.* Cyma *scorpioidea, ferrugineo-hispida.* Calycis *lobi lineares lanceolati cum* corollâ æquilongi virides, ferrugineo-hispidi. Corolla $\frac{1}{3}$–$\frac{1}{2}$ poll. lata, brevituba, alba vel roseo-tincta, explanata, *lobis latis obovatis obtusis æqualibus,* tubo brevissimo. Stamina 2, brevia, *filamentis latis spathulatis apice tridentatis;* antheris flavis conicis apicibus connatis. Ovarium conicum in stylum cylindricum angustiorem brevem arcuatum attenuatum. Stigma paullo latius, planum, integrum.

Lankawi, on damp rocks (*Curtis*, 2566).

The fruit of this I have not seen, and so am hardly certain as to its genus. The ovary is, however, shorter and thicker than in most *Didymocarpi.* The short tube and nearly regular flowers would seem to ally it to *D. regularis*, Ridl.

BŒA ELEGANS, sp. nov.

Caulis *decumbens, angulatus,* 6-pollicaris, $\frac{1}{8}$ poll. crassus, arachnoideus. Folia ternatim *verticillata, remota,* $\frac{1}{2}$–3 poll. inter se distantia, *lanceolata, acuta* basi (sæpius longe) attenuata, 1–2$\frac{1}{2}$ poll. longa, $\frac{1}{2}$–$\frac{1}{4}$ poll. lata, supra *griseo-arachnoidea, subtus cinnamomeo-arachnoidea.* Pedunculi *ex axillis subterminalibus, graciles glabri* 6 poll. longi; cyma terminalis 3 pollicaris, *ramis tenuibus paucis.* Calyx *perbrevis, lobis lanceolatis glabris.* Corolla $\frac{1}{2}$ poll. lata (lobis latis rotundatis) alba ore roseo. Stamina filamentis brevibus, antheris flavis oblongis. Stylus teres breviusculus; stigma clavatum. Capsula pollicaris, glabra, linearis, acuminata, valde torta.

Kedah Peak, on precipices towards the north.

This has a creeping stem with the apex turned up. The peduncles are strictly axillary, and have more of the appearance of a *Didymocarpus* of the *D. cordata* group. The whole plant, except the inflorescence, has a frosted appearance. The long slender peduncles terminate in a cyme of medium-sized flowers, white with a rosy centre.

I found it abundant, but with few flowers, on the bare, nearly vertical, slopes of granite rock on Kedah Peak.

PHYLLOBŒA SPECIOSA, sp. nov.

Suffrutex 1–2 pedalis dealbata, caulibus subteretibus tomentosis. Folia *bina remota,* lanceolata, acuminata, petiolata, 6 poll. longa, 1$\frac{1}{2}$ poll. lata, superne glabra (sicca nigricantia) subtus albo-arachnoidea; petiolus pollicaris. Pedunculi longi

validuli, laterales, erecti, ferme pedales. Flores remoti, ferme sessiles, bini, bibracteati, speciosi. Bracteæ ovatæ lanceolatæ, $\frac{1}{2}$ poll. longæ, albo-arachnoideæ. Calyx *trisepalus, coriaceus, lobis inæqualibus* (uno majore) latis ovato oblongis lanatis, albis, $\frac{3}{8}$ poll. Corolla *carnosa pollicaris*, cærulea, tubo lato; *lobi* 3, 2 *oblongi truncati*, *tertius multo latior.* Stamina *brevia*, ovarium haud superantia. Stylus longus, lanatus, cylindricus. Capsula pollicaris, lanceolata, cylindrica, acuminata, lanata.

Lankawi, common (*Curtis*, 2564), "*Chapah batu.*"

A stout shrubby plant, with the stems covered with a very thin white tomentum looking as if whitewashed, but rather silvery. The long inflorescences bear, at intervals of an inch or more, a pair of large stiff bracts closely appressed to the stem, and like the whole of the inflorescence, except the corolla, covered with a thin white wool. There is a pair of flowers in each pair of bracts, nearly sessile. Three calyx segments are connate into one sepal, and the corolla in the same way has some of its segments connate. The stout woolly capsule is also peculiar. It is a curious and handsome plant.

EPITHEMA SAXATILE, *Blume, Bijdr.*, p. 738.

Limestone rocks, at Kwala Lumpur and Lankawi (*Curtis*, 2107).

MONOPHYLLÆA HORSFIELDII, *R. Br. in Benn., Pl. Jav. Rar.*, p. 121.

Limestone rocks, Kwala Lumpur, in Selangor; at Kuran, in Perak (*L. Wray*, 597, Herb. Kew).

CYRTANDROMŒA ACUMINATA, *Benth. et Hook. f., Gen.*, ii. p. 1020.

Penang, Penara Bukit (*Curtis*, 1016).

C. MEGAPHYLLA, *Hemsl. in Hook., Ic. Pl.*, t. 1555.

Sungei Ujong, on Bukit Sulu; Selangor, at Kwala Lumpur Perak, common on the Thaiping Hills; Legeh (*Machado*).

On banks in thick jungle, flowers white, calyx dull red. It is called "*Supujit Bukit*" and "*Lumpuh Munahon*" by the natives.

STAURANTHERA UMBROSA, *C. B. Clarke, Comm. and Cyrt. Beng.*, t. 89.

Johore, on Gunong Panti; Pahang, Tahan River.

STAURANTHERA GRANDIFLORA, *Benth.*, *Scroph. Ind.*, p. 57.

Penang (*Wallich*, *Curtis !*); road to Balik Pulau, on damp rocks; very rare.

RHYNCHOTECHUM PARVIFLORUM, *Blume*, *Bijdr.*, p. 775.

Isanthera parviflora, Ridl. in Trans. Linn. Soc., Ser. II. (Bot.) iii. (1893) p. 331.

Pahang, Tahan River Woods; Penang, Penara Bukit (*Curtis*, 3035).

This is the plant recorded in DC. Monog. Phan., v. p. 196, as *R. parviflorum ?* var. *penangensis*, but from a comparison with plants from Java and Sumatra, collected by Forbes, it appears to be identical with *R. parviflorum*, Blume. The genus *Isanthera* seems hardly distinguishable from *Rhynchotechum*, and would probably be better merged in it.

TETRAPHYLLUM ROSEUM, *Stapf*, sp. nov.

Folia opposita, omnia valde approximata, summa 4-interdum subverticillata, elliptica vel obovato-elliptica, 2½–3½ poll. longa, 1¾–2¼ poll. lata, obtusa basi breviter abrupteque angustata, argute crenato-denticulata, supra læte viridia, nitida, bullata, adpresse sparseque laxe pilosa, subtus pallida, in nervis pilosa, cæterum minute punctulata; petiolus ad 2 lin. longus. Cymæ paucifloræ e foliorum summorum 3 vel 4 axillis ortæ ideoque specie in inflorescentiâ terminali 1 poll. altâ collectæ, bracteatæ; bracteæ oblongæ vel lanceolatæ; pedicelli sparse pubescentes, graciles, 6–7 lin. longi. Calyx profunde 5-fidus, inæqualis, vix 5 lin. longus; segmenta ovata, acuta, subplicato marginibus fere totâ longitudine contiguis ideoque tubum inflatum quasi 5-angulatum referentia, glabra, pallide viridia. Corolla glabra; tubus 5 lin. longus, albus leviter curvatus, a basi ampliatus; limbus roseus, bilabiatus, labio supero erecto bilobo lobis rotundato-ovatis, labio infero porrecto, 5–6 lin. longo lobis 3 ovatis subæqualibus. Stamina inclusa, fertilia 2; filamenta brevia, e basi crassa filiformia, arcte spiraliter contorta, glabra; antheræ apice cohærentes connectivo crasso albo, loculis oblongis basi divergentibus dense minuteque glanduloso-pilosulis apice poro obliquo dehiscentibus; staminodia minutissima. Ovarium oblongum, parce pilosulum; stylus ovario æquilongus; stigma viride, capitatum subbilobum, stylo distincte latius; placentæ parietalis, bilamellatæ lamellis recurvis dense ovuliferis. Capsula ovato-oblonga, 4–5 lin. longa, acuta, calyci persistenti æquilonga, loculicide atque septicide dehiscens, 4-valvis; nervi carpidiorum dorsales demum a basi soluti vel in apice diu cohærentes modo fibrarum persistentes. Semina minutissima.

Siam, at Pungah (*C. Curtis*).

[A specimen of this plant was sent to Kew by Messrs. Veitch, of Chelsea, raised from seed sent by Mr. Curtis. Previously only one species of this peculiar genus was known, *T. bengalense*, C. B. Clarke, a native of East Bengal; *T. roseum* differs in so many points that it may be considered a very marked and distinct species of the genus; the latter has glabrous, not silky flowers, the corolla is pink, not blue, the inflorescence somewhat lax, not capitate, the calyx obscurely five-angled, and the stigma distinctly broader. One very peculiar character, possibly of generic value, has been commonly overlooked, namely, the remarkable shape of the filaments, which are filiform, but tightly twisted in two to two and a half turns in *T. roseum*, while in *T. bengalense* the spirals are looser. The capsules are alike in both species; they are loculicidal and septicidal at the same time, but the loculicidal dehiscence takes place in such a way that the dorsal ribs of the two carpids remain unaffected, and persist as two strong fibres which cohere to the apex for some time after the dehiscence has taken place. The placentas, however, do not separate from the valves, as stated by Mr. C. B. Clarke, in De Candolle's Monog., vol. v. part I. p. 137; they split into two lamellæ, each of which remains connected with a valve.—O. STAPF.]

The addition of a new species of this remarkable genus is interesting. *T. roseum* has a short smooth or pubescent stem, concealed by the four large leaves which hang down to the ground. The flowers are borne in a compact mass, and are large and showy, rose colour with a white centre.

CYRTANDRA DISPAR, *DC. Prod.*, ix. p. 282.

Penang, on Government Hill; Perak, Thaiping Hills, on banks; also a native of Sumatra.

C. PILOSA, *Blume, Bijdr.*, p. 770.

Singapore (*Lobb*, Herb. Kew.); Penang (*Wallich*, 807), Penara Bukit (*Curtis*, 1018).

Lobb's locality is probably erroneous; it has never since been found in Singapore. The plant also occurs in Java and Sumatra.

CYRTANDRA DECURRENS, *De Vriese, Pl. Ind. Bat. Orient.*, p. 14.

Var. WALLICHII, *C. B. Clarke, in DC. Monog. Phan.*, v. p. 232.

Johore, at the base of Gunong Panti; Sungei Ujong, Bukit Sulu; Perak, Thaiping Hills; Penang (*Wallich, List*, n. 807, partim).

I doubt this being distinct from the preceding species, *C. decurrens*, De Vriese, *sensu maximo* is widely spread over all the islands from New Guinea to Sumatra.

The native name in Sungei Ujong for the plant is "*Gugunjah Putih*" (*Gunjah* is probably the same as *Ganja*, *i.e.*, *Cannabis sativa*, Linn., and the name would mean white-flowered hemp).

C. PENDULA, *Blume, Bijdr.*, p. 768.

Abundant in rocky ravines in dense jungle, from sea level up to about 1,000 feet altitude, often thickly covering the ground.

Singapore, common in several spots, Bukit Timah, &c.; Johore, on Gunong Panti, and on Pulau Tioman, an island off the east coast; Selangor, at Kwala Lumpur; Perak, Thaiping Hills; Pahang, at Kwala Tembeling; Malacca (*Maingay*, in Herb. Kew.); also in Java and Sumatra.

The drawing by Prince in the Kew Herbarium, referred in the Flora of British India to *C. bicolor*, Jack, appears to me to be merely a small plant of *C. pendula*, Blume. Jack's species is distinguished mainly by the red wool on the underside of the leaves, which he says (Trans. Linn. Soc., xiv. p. 27), were purple beneath; a Sumatran plant collected by Korthals in Herb. Kew appears to belong to this species. There are two forms to be met with in Singapore, in one the leaves are ovate cordate and usually crenate, in the other, a weaker plant, they are rhomboid lanceolate and taper into the petiole, and are often entire. I have had many of both forms under cultivation, and find it very difficult to specifically distinguish them. The leaves of both forms are often marbled with white. The length of the peduncle and number of flowers in a head also vary considerably.

The flowers are of a creamy white, with purple spots in the tube. The sausage-shaped "berry" is of a light brown colour.

The plant is called "*Poko Assam Batu*" by the natives (lit. Acid rock plant), and the leaves, which are slightly acid, are used by them in curries.

CYRTANDRA (§ AUREÆ) CUPULATA, sp. nov.

Suffruticosa, 2–3 pedalis. Caulis teres superne subquadrangulatus, ferrugineo-villosus. Folia *opposita, æqualia,* valde variabilia, maxima 12 poll. longa, 4 poll. lata, *oblanceolata, petiolata,* basi acuminata vel petiolo basi late alato, acuta sæpe acuminata, *serrato dentata,* superne *parce hispida,* subtus *hispidiora,* carinâ et petiolo villosis, dentibus fasciculis pilorum munitis, petiolo ad 1 pollicem longo. Pedunculi usque ad $\frac{1}{2}$ poll. longi axillares bini oppositi crassiusculi villosi. Bracteæ *coalitæ, cupulam* pollicarem *albam hispidam formantes,* apicibus acutis. Bracteolæ breviusculæ lanceolatæ, acutæ, albæ. Flores plures in cymâ, singulatim expansi *cupulam vix superantes.* Corolla 1 poll. longa, curva, infundibuliformis, bilabiata, pubescens, alba, tubo intus flavo et bruneo, *lobis* 5, *subæqualibus ovatis obtusis.* Stamina inclusa 2, filamentis tortis sigmoideis, antheris oblongis. Pistillum multo brevius; ovarium oblongum apice a fasciculo pilorum ornatum; stylus brevis, crassus curvus flavescenti-viridis. Stigma clavatum latiusculum, bilobum. Bacca $\frac{1}{2}$ poll. longa fusiformis virescens.

Pahang, Tahan Woods, local (2150). In wet ravines.

The bracts form a yellowish-white cup with a long point at each end. The flowers hardly project beyond, and are saturated with the water contained within the cup. The bracts fall off before fruiting. The leaves vary much in form, sometimes having a distinct hairy petiole, others have a broad wing to the very base.

C. LANCEOLATA, sp. nov.

Caulis pedalis, *quadrangularis,* basi longe nudus glaber superne pubescens. Folia 12 poll. longa, 4 poll. lata, *oblanceolata* acuta basi acuminata petiolata *crenulata, ferme omnino glabra.* Cymæ in basi caulis *brevissime pedunculatæ* laxæ, plurifloræ; pedicelli $\frac{3}{4}$ pollicaris, graciles hispidi; *bracteæ parvæ,. lanceolatæ, hispidæ.* Calyx $\frac{1}{2}$-pollicaris tubulosus, *hispidus; lobi* 3, *lineares acuminati.* Corolla $1\frac{1}{2}$ pollicaris, basi tubulosa superne dilatata, pubescens, alba fauce flavo. Stamina 2, filamentis longis linearibus tortis, antheris longis basi incrassatis apice attenuatis angustis. Stylus pollicaris,

pubescens; stigma bilobum, lobis oblongo-linearibus. Capsula deest.

Johore, on Gunong Panti (December, 1892).

I collected but one plant of this, and that in flower. It is allied to *C. radiciflora*, C. B. Clarke.

CYRTANDRA SUFFRUTICOSA, *Ridl. in Trans. Linn. Soc.*, Ser. II. (*Bot.*) iii. (1893) p. 330.

Collected in Pulau Tioman by myself, has again been obtained by Mr. Feilding at Tengarah, on the mainland of Johore.

On Discoveries resulting from the Division of a Prothallus of a Variety of *Scolopendrium vulgare*, Sm. By E. J. Lowe, F.R.S., F.L.S.

[Read 20th February, 1896.]

It is desirable to add a few introductory remarks as the discoveries described in the present paper have resulted from experiments that have been continuous since 1857.

In 1866 a large collection of crossed ferns was exhibited at the Nottingham Meeting of the British Association, and in 1867 a paper on "The Abnormal Forms of Ferns (a new method of obtaining varieties)" was introduced to the Dundee meeting of the same.

In 1881 a paper on "Hybrid Ferns" was read at the Linnean Society,* but was not printed, Mr. Moore writing: "Botanists will not allow a possibility to cross ferns, though *somehow* I can see you have *the blood of each combined.*"

In 1888, Colonel Jones and myself read a paper on "Abnormal Ferns, Hybrids and their Parents" at the British Association Meeting at Bath (see 'Annals of Botany').

In 1890 at the Fern Conference of the R. Hort. Soc. I read another paper on "Hybrid Ferns and Crossed Varieties." In the discussion on this paper, Professor Scott remarked: "If the result were really due to multiple hybridization it would involve the fertilization of an ovum by several spermatozoids, each contributing somewhat of its own character to the offspring. This supposition contradicted all that was directly known as fertilization in ferns, in which it had always been found that only a single spermatozoid fused with the ovum." In two papers, viz:—"Facts regarding the Prothalli and Propagation of Ferns," and "Ferns and their Multiple Parents," were presented to the British Association Meeting at Cardiff in 1891, and divided prothalli which had been three years in the prothalloid state were there exhibited.

And, in 1895, a history of all these experiments was published under the title of 'Fern Growing,' including all these investigations to the time when the present microscopical examinations discovered new facts, including the certainty that more than one plant had been produced from the same prothallus, a fact that removes a great difficulty as regards multiple-parentage.

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* 'Proc. Linn. Soc.' (1880-82), p. 6.

The foregoing remarks having explained the general direction of previous investigations, I now come to special work.

In 1887 I determined to investigate the results of dividing Fern prothalli, and in the autumn of that year spores were very thinly sown, in order to procure single vigorous prothalli that would allow of division into four portions. In 1888 a number of these were divided, 25 prothalli produced 100 divisions, and the experiment was so successful that 96 of the plants grew. Many of the divisions had no rootlets, but these were soon formed when the cultures were kept in a damp, close atmosphere under bell-glasses. These divisions grew into sturdy little tufts, much more bush-like than those prothalli that had not been divided.

The prothalli were divided on the assumption that, except under rare circumstances, the archegonia were widely separated from the antheridia and that it might be possible to keep them on different divisions, that such was true these experiments have proved, for with 48 portions that had archegonia, not one produced fronds until the male portions were brought in contact with them. It may be mentioned that some of the divisions were purposely left carefully guarded against any chance of the contact of sperms from antheridia, and one of these now under examination at the Royal Gardens, Kew, was divided on January 6th, 1888, and left here on January 7th, 1896, still in the prothalloid condition. I have been able to keep this (and many others) from frond-life for eight years. In February, 1892, all of the divided prothalli of 1888 were alive, yet none had developed frond-life. In some of the examples the whole four portions were planted in a half-pint flower pot, an inch apart, and kept closely protected by a bell-glass; at this distance apart the antheridia did not affect the archegonia.

In February, 1892, most of the divisions seemed unhealthy, and were repotted, two of these had portions having antheridia planted as closely as possible to two others having archegonia, in order to ascertain if any sexual life remained, and in July three distinct frondlets appeared, whilst the remaining isolated portions retained their prothalloid life only.

On October 15th, 1893, one of the split prothalli threw up a frondlet, how impregnated it was then impossible to say, but a skipjack (*Podura plumbea*) was noticed under the bell-glass, it might have been there for some time, for the plants had not been examined for three weeks, owing to my illness. A portion of the prothallus containing this frondlet was severed from the rest of the prothallus, and grew rapidly, the remainder also grew healthily. Subsequently an experiment was made with a skipjack, portions of prothalli ($5\frac{1}{2}$ years old) were planted in a pan and covered with an inverted wine-glass, these had only archegonia, but outside this glass portions having only antheridia were planted, and the whole covered with a large bell-glass; skipjacks were introduced in the outer portion, and left there for a few days: then the wine-glass was removed, and the skipjacks had access to the portions having archegonia; the insects were removed in 24 hours, and in 14 days afterwards frondlets appeared, but they were certainly two or three days old when detected, therefore the period from impregnation to frond-life was probably only 12 days. At the same time, in a second pan, portions bearing male, and portions bearing female organs were planted half an inch apart, but, although under the same bell-glass, after three months they had produced no frond-life.

The special experiment which is to be described is the *repeated* division of one portion of a prothallus in order to remove every portion of the original prothallus.

In the divided prothalli it is necessary to point out that the archegonia are assumed to be on the upper half, and that in dividing them, the sexes are kept on different portions. I know that it is said that archegonia and antheridia are sometimes found together, but in the large number of experiments that I have made on the assumption that they are far apart, I have not had an instance of frond-life occurring until an upper and a lower portion has been brought together, and there has never been an instance, after bringing them together, of a failure to produce frond-life.

In repeating these divisions of the same divided prothalli, it is evident that from the new growth of the prothalli in each division the original prothalli becomes further and further removed from the portion where the archegonia were situated until it is possible to cut off a portion that has no part of the prothalli having the female organs, and in fact there is an absence of the whole of the original prothallus.

In the experiments described in this paper the first division was made on January 6th, 1888; this was again divided in the autumn of 1893,* a third time it was divided in September, 1894, and a fourth in February, 1895. One of these divisions produced fronds in May, 1895, whilst under a bell-glass, and without any artificial impregnation, *i e.*, new generative organs had been formed. There were two of these divisions, one having four and the other five plants growing round the margin, whilst in both cases a very peculiar plant grew from the centre (I have only taken two of these examples, as these are the only ones that have been microscopically examined by experts).

The portions did not all form fronds at the same time, but they were spread over several months. One portion on January 8th, 1896, is yet in the prothalloid condition, and is being watched by Mr. Lang, Dr. Scott, and Professor Farmer.

The middle plants in the before-mentioned two examples had quite a *Marchantia* look and were actually mistaken for Liverwort, until it was pointed out that they must be fronds, as they bore stipes; the margins of these fronds also curled back in a singular manner. No two central plants have been alike, but they all had originally Marchantia-looking fronds. These have been examined by Professor Bower and Mr. C. Druery, and subsequently by Professor Farmer. The last prothallus is now at Kew; this prothallus is not in such an advanced state, so that we may yet expect the development of other peculiarities.

The marginal plants are not botanically different, but they apparently show the parentage of *Scolopendrium vulgare*, var. *crispum*, in the offspring. The archegonia were not present until after the new prothalloid growth, it will therefore be interesting to see the development of their characters; the plants are yet too young to ascertain their peculiar features beyond that of being crisped, and the variety *crispum-cowburni* was one of the parents; not only does this apply to all these marginal plants, but also to two of the central ones; two other central plants have no crisp character. The diminutive fronds of the central plants have been so peculiar and so Liverwort-like in character as to suggest the name of *Marchantia*-form fronds. Their margins are flattened out, and are very thin and semi-transparent, having a growth of prothalli along the edge; Professor Farmer considers it a case of premature apospory. The last prothallus has not yet formed any fronds, but has shown from a partial microscopic examination archegonia on the under surface.

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* It may be explained that between 1888 and 1893 I made no subdivisions, I was then only ascertaining how long a prothallus could be kept alive without frond-life, every now and then crossing one or more, but in 1893 it occurred to me to ascertain by a series of subdivisions what would result from such experiments, and a peculiar growth of plant-life, apospory, archegonia, and antheridia, has been the consequence.

My thanks are due to Professor Bower, Mr. C. Druery, Professor Farmer, and Mr. Lang for their reports on microscopical examination, an examination that has shown such interesting facts.

Independently of apospory and the formation of male and female organs on entirely new growth of repeatedly divided prothallia, there is something very remarkable as regards the frond-life. The central plants are unlike the marginal ones, they differ in form and botanically; on the contrary, the marginal plants are all more or less alike, as might be expected when growing on the same prothallus from what may be termed assimilation, but in the central plants something requires elucidation as no two are alike, and all differ from the marginal ones (they apparently grow on the upper surface). The first plants were very curious, but owing to a serious illness I could not give proper attention to their young growth, yet all showed the thinning off and semi-transparency; their after growth shows in the first a congested mass of fronds, diminutive and ball-like; the fronds are less than 1¾ inches, of which an inch is the stipes, the width is half an inch; it is a mass of murications curling back on the underside, very hard and unbending, and the colour a deep green, this plant is at Kew; a second developed stipes with cornute apices, but no leafy part; a third is muricate with a bead-like fimbriated margin; a fourth has a bud-growth on the fronds, and a branching stag's-horn-like mass at the base; it is muricate, has projections, and is leathery in texture, this is also at Kew; in a fifth the fronds are crisp and wavy, has the ordinary consistency of a crispum, and apparently will not be congested;

a sixth is bipinnate and muricate, having broad projections that are smooth except near the base, paraferent often with two rosette-like cups a short distance apart, and with a twisted cornute apex that is cochleate, and truncate; the rachis often thickened and having a warty appearance. Length of frond 5 inches, of which 3 is the stipes. The two illustrations here given of the sixth example show the upper and under surface of the frond from a plant which is growing out of doors. This has now grown out of its abnormality.

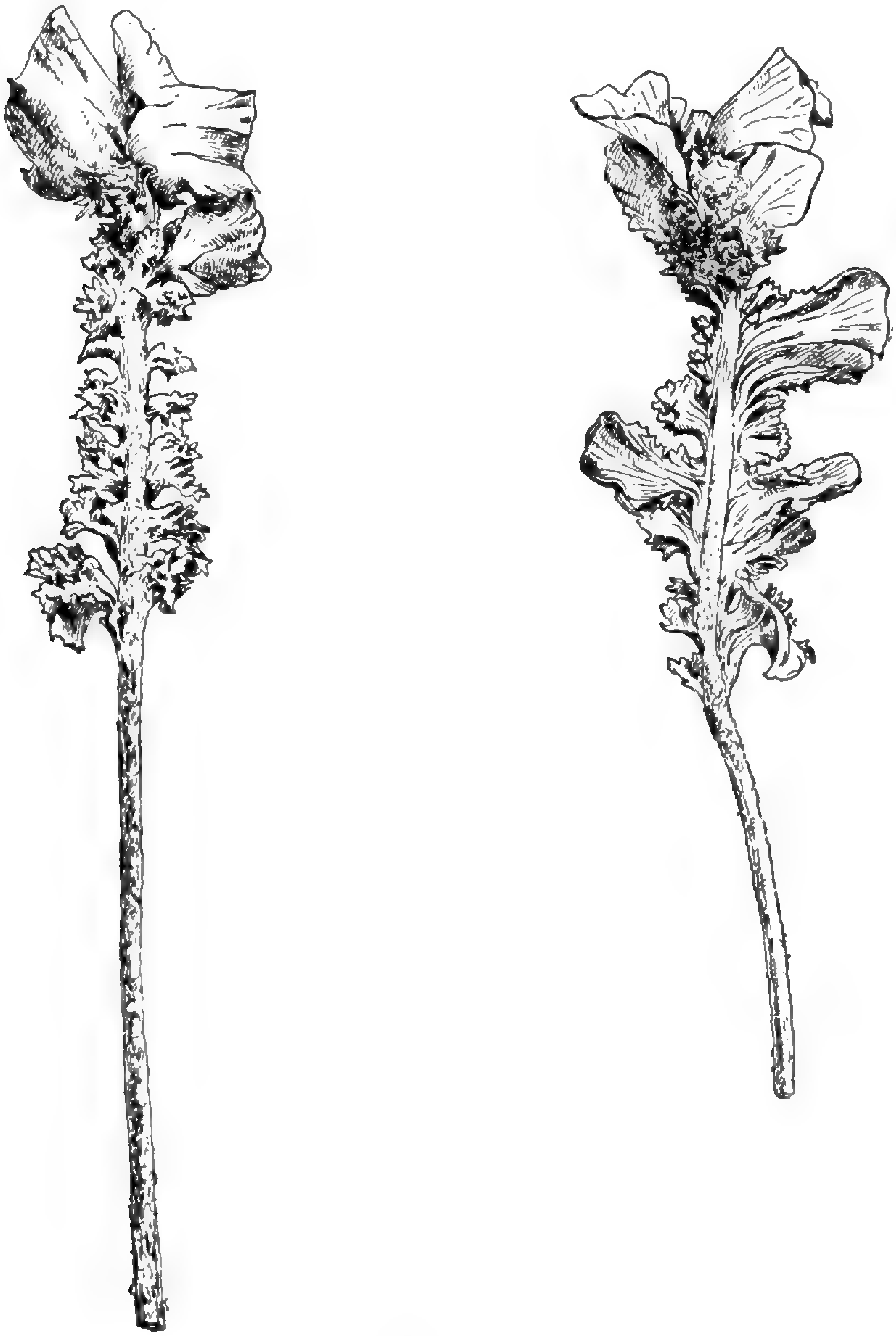

FIG. 2.

REPORT OF MR. C. T. DRUERY, F.L.S.

With reference to your remarkable *Scolopendrium*, I give you herewith *resumé* of my observations on the material previously sent me in this connection. The first specimen you sent was a ramose prothalloid growth which I considered to be a species of *Marchantia*, a belief that was strengthened by the fact that on pegging it down and keeping it close it speedily commenced growth at all terminals precisely as that family would do; later on, however, a dense confervoid growth, evidently introduced with it* (as my soil was carefully sterilized), so repeatedly invaded it that it perished. Meanwhile, however, you had sent me fronds and a small plant, developed as you stated from similar abnormal prothalli, and these in themselves displayed such, to my mind, marchantioid characters that I sent one of the fronds to Mr. Antony Gepp, of the British Museum, for his opinion. The frond I sent him resembled a small inch-long frilled or crisped *Scolopendrium*, frond bearing a short stalk, but was of so fleshy a character and so distinctly growing *Marchantia*-fashion from its edges and fimbriations that I was still misled; however, it was pronounced to be no *Marchantia*, but a true fern, and I found on renewed scrutiny, the furcate venation of *Scolopendrium*, which resolved my doubts entirely. This frond, and a companion, I laid down under culture; the companion frond was of a different shape, having pinnatifid projections, instead of a continuous crisped and frilled edging. These projections in all cases became bluntly bifid and undoubtedly prothalloid, the indentation of the bifid tip being a *sinus* occupying the same relative position to a thickened cushion, bearing root-hairs, archegonia, and antheridia (which were also developed in due course), as does the sinus of a normally produced prothallus. The other frond in a very short time acted very differently. In this case the edges developed semi-transparent fimbriations evidently of prothalloid nature, but the great part of the upper surface budded out into innumerable small prothalli crowded densely together. This frond and a third of similar character I have sent to Professor F. O. Bower, retaining only the pinnatifid one and the little plant I have mentioned. This plant when sent to me was represented by two or three small roundish fronds which seemed to be developed independently from an attached prothalloid mass which I did not disturb for fear of destroying the plant itself. I could then detect no normal axis of growth such as is seen as a small white caudix in seedling Scolopendriums. The fronds, however, grew though slowly, and after a time another rose, evidently circinate, and from the midst of the clump, and this being followed by two others demonstrated to me by the angle of their growth that a true axis existed, though still the characteristic whitish scales were and are absent. These fronds, however, present no sign of that rapidly increasing size which distinguishes normally developed Hart's-tongue, and all the fronds are so small that a sixpence would cover the entire plant. This smallness consequently necessitates the use of a lens for examination, and with this it is seen that each frond is bluntly lobed at its termination, and bears a distinct sinus, associated as before described with a cushion bearing archegonia, antheridia, and incipient root-hairs on its under surface. We have here consequently a position as nearly as possible intermediate between sporophore and oophore, the sporophoric character distinctly existing in the shape of a circle of stalked fronds generated spirally from a regular axis of growth, while the oophoric character as distinctly appears in the fact that these fronds are practically stalked prothalli bearing the sexual apparatus proper to them.

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* Sterilized soil is difficult to keep so for a long time, as conferva (*Vaucheria sessilis*) grows up the damp pot and eventually enters the soil, and it even grows on the glass covering. I constantly stir the surface.—E. J. L.

Your plants, it is manifest from the fronds sent me, are much more vigorous than mine, the fronds of which are certainly barely half an inch high, and it is also clear from the diversity shown in the two classes of fronds described that there is considerable variation in form. As regards the genesis of these ferns I cannot, of course, give an opinion, but I am inclined to think that the phenomenon has not been induced by division but that some one prothallus has sported, and by lending itself so easily to propagation by division has yielded you the batch you possess.*

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* In confirmation of the opinion I have formed as regards being produced by *division and subdivision*, all these have produced these singular properties, but in the hundreds of examples of simple division it has never been produced.—E. J. L.

The large frond you sent me to-day with a young frond growing upon it seems of a likely type to spring from the batch, but I found no trace of prothalloid growth upon it and the young fern upon it is a bulbil pure and simple, which is not uncommon in these muricate and irregular varieties.* We now come to the consideration of how far this case of apospory, for that is what it is, differs from preceding ones, and the chief difference I find to consist in its persistence after the axis of growth has been fairly started. In *Lastrea pseudo-mas*, var. *cristata*, which I exhibited at the Linnean Society in 1892,† the first fronds bore prothalli in profusion, and these fronds being layered, the prothalli developed plants, the first fronds of which were simply long-stalked prothalli. In this case, however, the third or fourth fronds lose the aposporous character and the resulting plants are quite undistinguishable from the ordinary *L. pseudo-mas*, var. *cristata.* The case of *Scolopendrium*, var. *crispum Drummondæ* (*vide* 'Journ. Linn. Soc.' (Bot.), xxx (1894), p. 281) differs from yours in the fact that although the prothalli produced aposporously from its fimbriations are very viviparous in themselves (a single tip forming a mass of prothalli nearly filling a thimble pot and yielding a number of plants) and some of the young fronds are transparent on the edges and evidently prothalloid, they, like the adult fimbriation, display no signs of sexuality until layered. The third case which trenches upon yours is that of *Athyrium Filix-fœmina*, var. *clarissima*, Bolton, in which the primary fronds of the aposporous seedlings are also distinctly prothalloid and act like prothalli when pegged down. Your Scolopendriums then, it is clear, are distinguished by the persistence of their aposporous character and by their capacity for developing archegonia and antheridia without being layered, while if the large frond in question really sprung from this brood, it points to the same temporary character of precocious apospory as distinguishes the other cases cited.

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* I should like to add to this that the plant from which this frond was taken, although now normal botanically, had the same prothalloid growth in a very pronounced manner, although I was too ill at the time to do more than look at it whilst in bed. All these fronds have for some time been bulb-bearing, and now it is bulbiferous on the stipes below the soil.—E. J. L.

† 'Proc. Linn. Soc.' (1892–93), p. 2.

REPORT OF PROFESSOR F. O. BOWER, D.Sc., F.R.S.

The flat green expansions are portions of a *fern-frond*, they are not prothalli but show a vascular strand in the middle of the stalk when cut transversely and the tissues have intercellular spaces, which are absent in prothalli at their margins; they have produced, by very prolific aposporous growth, prothalli with antheridia on the smaller ones, and on the largest, archegonia. The smaller plant with leaves shows again the aposporous development, prothalli originating from the margins of its leaves. I think this has already been recorded by Mr. Druery.

EXTRACT FROM A LETTER OF PROFESSOR J. BRETLAND FARMER, F.L.S.

As to the fern plants you sent me some weeks ago, it was from the edge of the stalked frond that the prothallium was developed. Thus [referring to a figure which is not reproduced here] the shadow portions represent the place where the outgrowths occurred. It is very clear as the thickness of the frond *suddenly* diminishes there and the intercellular spaces which are characteristic of the leaf proper entirely disappear.

I should regard the case as being one of premature apospory if I may use such a term; I mean that the edge of a leaf too young (as regards the whole plant) to bear sporangia at all, had at once grown out to the other generation. What I had hoped to find and what would have settled the affair was *dividing nuclei*, for in the prothalloid generation these are only half the number of nuclear segments (chromosomes) as compared with those in the frond plant. I find it impossible in these sections cut by hand to prevent the prothalli outgrowth breaking away from the frond, and the series I was trying to embed and cut with the microtome unluckily did not succeed. Still, I have no hesitation in affirming that on these early fronds the prothalloid structures are developed as outgrowths from the edges or from the lower surface just within the edge of the frond. On the section I am sending you, which only includes the prothalloid outgrowth, you will notice archegonia on the *upper* surface of the prothallium. May not this account also for your getting plants from the middle of your prothalia?

Dr. Scott reports that Mr. Lang examined a detached portion (of the prothallus sent to Kew on January 6th), and looked at the upper surface of the whole under a simple microscope. He found no antheridia, and archegonia only on the lower surface (of the detached bit). Of course a *thorough* examination could not be made without killing the prothallus.

Independent cultures are still under examination both at Kew and by Mr. Druery.

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